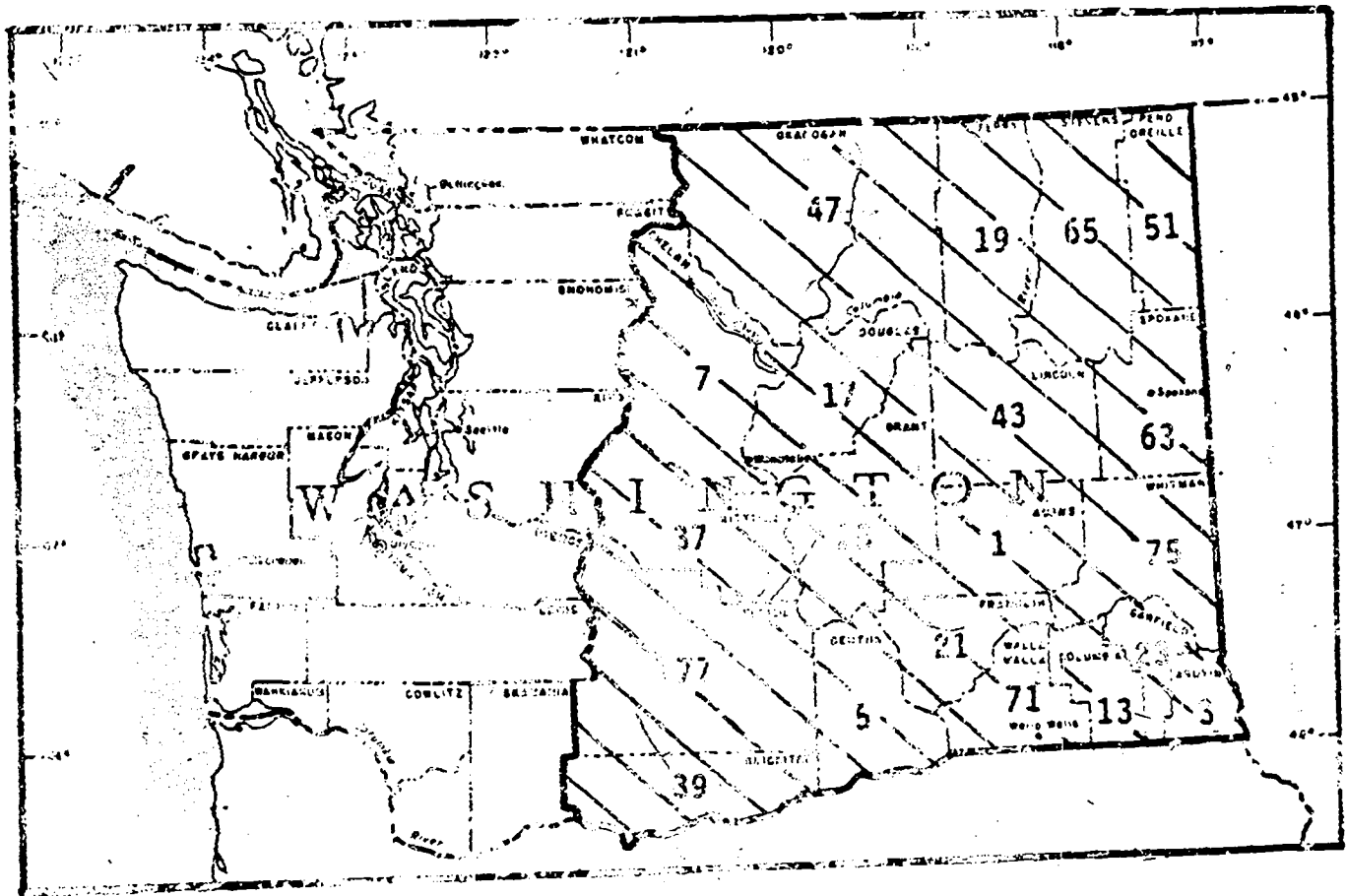


FIELD INSTRUCTIONS

FOR THE

INVENTORY OF EASTERN WASHINGTON

1991



FOREST INVENTORY AND ANALYSIS WORK UNIT

PACIFIC NORTHWEST RESEARCH STATION

USDA FOREST SERVICE

FIELD INSTRUCTIONS FOR THE
INVENTORY OF EASTERN WASHINGTON
1991

Prepared
by
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TALLY GUIDE FOR N/R POINTS ON SAMPLE KINDS 2 AND 7
REMEASUREMENT PLOTS

LINE#	PT	TH	SPP	AZM	DIST	TRN	OC1 INC	OC1 DBH	OC2 DBH	OC3 DBH	OC2 HGT	OC3 HGT	BH AGE	C/B	C/C	G1	D/ U	M	CL	CO	CR	DC	REMARKS:		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
XXXXX	NR	1	XXX	XXX	XXXX	---	---	LLLL	XXXX	XXXX	PPP	XXX	XXX	X	X	X	XX	--	C	M	--	-	-	Live tree tallied <12.5 cm dbh at OCC2. Still live and <12.5 cm dbh at OCC3. On 2.1m fixed-radius plot.	
XXXXX	NR	1	XXX	XXX	XXXX	XXX	---	LLLL	XXXX	XXXX	PPP	HHH	XXX	X	X	X	XX	--	C	M	XX	X	-	Live tree tallied <12.5 cm dbh at OCC2. Still live and >12.5 cm dbh at OCC3. On 2.1m fixed-radius plot.	
XXXXX	NR	1	XXX	XXX	XXXX	XXX	---	LLLL	XXXX	XXXX	PPP	HHH	XXX	X	X	X	XX	--	C	M	XX	X	-	Live tree tallied >12.5 cm dbh at OCC2 and OCC3. Full remeasurement plot at OCC2.	
XXXXX	NR	1	XXX	XXX	XXXX	XXX	UUU	UUUU	UUUU	XXXX	---	HHH	XXX	X	X	X	XX	--	C	M	XX	X	-	Live tree tallied >12.5 cm dbh at OCC2 and OCC3. Walk-thru plot at OCC2.	
XXXXX	NR	2	XXX	XXX	XXXX	XXX	BBB	----	BBB	XXXX	---	HHH	XXX	R	X	R	X	XX	--	C	M	XX	X	-	Live tree on M/R point >12.5 cm dbh at OCC3 and not on the 2.1m fixed-radius plot. Not tallied and not missed at OCC2. (Ongrowth tree)
XXXXX	NR	3	XXX	XXX	----	----	----	LLLL	PPFF	----	PPP	---	XXX	X	-	X	XX	--	C	M	--	-	-	Tree tallied or reconstructed as live and <12.5 cm dbh at OCC2. Culturally killed since OCC2. On 2.1m fixed-radius plot.	
XXXXX	NR	3	XXX	XXX	XXXX	XXX	---	LLLL	PPFF	----	PPP	---	XXX	X	-	X	XX	--	C	M	XX	X	-	Tree reconstructed (SK 2 only) or tallied live and >12.5 cm dbh at OCC2. Culturally killed since OCC2.	
XXXXX	NR	4	XXX	XXX	XXXX	---	----	----	XXXX	---	XXX	XXX	-	X	-	X	XX	--	C	M	--	-	-	Live tree <12.5 cm dbh at OCC3 on 2.1m fixed-radius plot. Not alive at OCC2.	
XXXXX	NR	4	XXX	XXX	XXXX	XXX	---	----	----	XXXX	---	HHH	XXX	-	X	-	X	XX	--	C	M	XX	X	-	Live tree >12.5 cm dbh at OCC3 on the 2.1m fixed-radius plot. Not alive at OCC2. Bore for BH age.
SSSSS	NR	5	XXX	XXX	----	----	----	LLLL	PPFF	----	PPP	---	XXX	X	-	X	XX	XX	C	M	--	-	-	Tree tallied or reconstructed as live and <12.5 cm dbh at OCC2. Died since OCC2. On 2.1m fixed-radius plot.	
SSSSS	NR	5	XXX	XXX	XXXX	XXX	---	LLLL	PPFF	----	PPP	---	XXX	X	-	X	XX	XX	C	M	XX	X	-	Tree reconstructed (SK 2 only) or tallied live and >12.5 cm dbh at OCC2. Died since OCC2.	
XXXXX	NR	6	XXX	XXX	XXXX	---	----	RRRR	XXXX	RRR	XXX	XXX	R	X	R	X	XX	--	C	M	--	-	-	Live tree <12.5 cm dbh at OCC3. Missed but "in" at OCC2 or a seedling not tallied at OCC2. OR: an additional stocking seedling at OCC3 that was present but not qualified as OCC2 tally. On 2.1m fixed-radius plot.	
2XXXX	NR	6	XXX	XXX	XXXX	XXX	BBB	----	BBB	XXXX	---	HHH	XXX	R	X	R	X	XX	--	C	M	XX	X	-	Live tree >12.5 cm dbh at OCC3. Missed but "in" at OCC2.
XXXXX	NR	7	XXX	XXX	XXXX	---	----	XXXX	XXXX	XXX	XXX	---	---	---	XX	XX	-	---	--	--	--	-	X	Snag >22.5 cm dbh at OCC2 and OCC3.	
XXXXX	NR	7	XXX	---	----	----	----	XXXX	----	XXX	---	---	---	---	XX	XX	-	---	--	--	--	-	-	Snag >22.5 cm dbh at OCC2. Gone or <22.5 cm dbh or <2m tall at OCC3.	
SSSSS	NR	7	XXX	XXX	XXXX	---	----	RRRR	XXXX	RRR	XXX	---	---	---	RR	XX	-	---	--	--	--	-	X	Snag >22.5 cm dbh at OCC2 and OCC3. Missed at OCC2.	
XXXXX	NR	8	XXX	XXX	XXXX	XXX	---	LLLL	PPFF	----	PPP	---	XXX	X	-	X	XX	XX	C	M	XX	X	-	Tree reconstructed (SK 2 only) or tallied live and >12.5 cm dbh at OCC2. Harvested since OCC2.	
XXXXX	NR	9	XXX	XXX	XXXX	---	----	XXXX	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	Reference only tree.	
XXXXX	NR	0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	Point with no live tally at OCC2 or OCC3.	

X - Item must be completed

B - Establish OCC2 dbh by boring increment. Record increment between OCC2 and OCC3 in OC3 INC. "Remarks". If a hardwood, estimate OCC2 dbh rather than bore increment.

C - Conifers only. Code as of OCC2 if reconstructed as alive at OCC2, but now culturally killed, dead, or harvested.

F - If tree is reconstructed, record current dbh as OCC2 dbh and reconstruct items 15, 17, and if OCC2 dbh >12.5 cm, reconstruct items 23 and 24. If tree was live OCC2 tally, but has no downloaded OCC2 dbh, record the larger: OCC1 dbh or current dbh.

H - Measure heights on all normally-formed live trees >12.5 cm dbh on points 1 and 2. Continue measuring heights on normally-formed conifers until 4 conifers >12.5 cm dbh have measured heights. Continue measuring heights on normally-formed hardwoods until 4 hardwoods >12.5 cm dbh have measured heights. Also measure height on 1st live tree >12.5 cm dbh of a species not previously tallied on the plot if normally-formed. Also measure height on live normally-formed live tally that are of largest and smallest dbh >12.5 cm dbh on the plot. If less than 16 live prism tally trees on the plot, measure or estimate height on remaining prism trees without a height.

L - OCC1 dbh is downloaded/printed if recorded during OCC1 inventory.

M - Hardwoods only. Code as of OCC2 if reconstructed as alive at OCC2, but now culturally killed, dead, or harvested.

P - Downloaded/printed if measured or field-estimated at OCC2. If OCC2 dbh is <12.5 cm and no OCC2 height is present, estimate OCC2 height.

R - Reconstruct the item. If TH=6 and OCC3 dbh <12.5 cm, reconstruct OCC2 dbh if alive at OCC2.

S - Same line number if a mortality tree and a snag are the same tree.

U - OCC1 dbh is listed. If OCC1 dbh > OCC3 dbh: check OC1 DBH and establish OC2 DBH, revise OCC1 dbh (if needed), record OCC2 dbh, record increment between OCC2 and OCC3 in OC3 INC, and... record increment between OCC1 and OCC3 in "Remarks".

TALLY GUIDE FOR N POINTS ON PLOTS WITH SAMPLE KINDS 2, 4, AND 7

LINE#	PT	TH	SPR	AZM	DIST	TRN	OC3 INC	OC DBH	OC2 DBH	OC3 DBH	OC2 HGT	OC3 HGT	BH AGE	C	B	C	C	C1	D/ U/M	CL	CO	CR	DC	REMARKS:	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
XXXXX	NX	2	XXX	XXX	XXXX	---	---	---	---	XXXX	RRR	XXX	XXX	R	X	R	X	XX	--	C	M	--	-	-	Live tree <12.5 cm dbh at OCC3. Live at OCC2.
XXXXX	NX	2	XXX	XXX	XXXX	XXX	BBB	---	BBBB	XXXX	---	HHH	XXX	R	X	R	X	XX	--	C	M	XX	X	-	Live tree >12.5 cm dbh at OCC3. Live at OCC2.
XXXXX	NX	3	XXX	XXX	---	---	---	---	DDDD	---	RRR	---	XXX	R	-	R	-	---	--	C	M	--	-	-	Tree reconstructed as live and <12.5 cm dbh at OCC2. Culturally killed since OCC2. On 2.1m fixed-radius plot.
XXXXX	NX	3	XXX	XXX	---	---	---	---	DDDD	---	---	---	XXX	R	-	R	-	---	--	C	M	XX	XX	-	Tree reconstructed as live and >12.5 cm dbh at OCC2. Culturally killed since OCC2.
XXXXX	NX	4	XXX	XXX	XXXX	---	---	---	---	XXXX	---	XXX	XXX	-	X	-	X	XX	--	C	M	--	-	-	Live tree <12.5 cm dbh at OCC3 on 2.1m fixed-radius plot. Not alive at OCC2.
XXXXX	NX	4	XXX	XXX	XXXX	XXX	---	---	---	XXXX	---	HHH	XXX	-	X	-	X	XX	--	C	M	XX	X	-	Live tree >12.5 cm dbh at OCC3 on the 2.1m fixed-radius plot. Not alive at OCC2. Bore for BH age.
SSSSS	NX	5	XXX	XXX	---	---	---	---	DDDD	---	RRR	---	XXX	R	-	R	-	---	XX	C	M	--	-	-	Tree reconstructed as live and <12.5 cm dbh at OCC2. Died since OCC2. On 2.1m fixed-radius plot.
SSSSS	NX	5	XXX	XXX	---	---	---	---	DDDD	---	---	---	XXX	R	-	R	-	---	XX	C	M	XX	XX	-	Tree reconstructed as live and >12.5 cm dbh at OCC2. Died since OCC2.
XXXXX	NX	7	XXX	XXX	XXXX	---	---	---	XXXX	XXXX	XXX	XXX	---	-	-	-	RR	XX	-	-	-	-	-	X	Snag >22.5 cm dbh reconstructed as "in" at OCC2 and OCC3.
XXXXX	NX	7	XXX	---	---	---	---	---	XXXX	---	XXX	---	---	-	-	-	RR	XX	-	-	-	-	-	-	Snag reconstructed as snag >22.5 cm dbh "in" at OCC2. Gone or <22.5 cm dbh or <2m tall at OCC3.
SSSSS	NX	7	XXX	XXX	XXXX	---	---	---	RRRR	XXXX	RRR	XXX	---	-	-	-	RR	XX	-	-	-	-	-	X	Snag >22.5 cm dbh at OCC2 and OCC3. Missed at OCC2.
XXXXX	NX	8	XXX	XXX	---	---	---	---	(XXXX)	---	---	---	XXX	R	-	R	-	---	XX	C	M	XX	XX	-	Tree reconstructed as live and >12.5 cm dbh at OCC2. Harvested since OCC2.
XXXXX	NX	9	XXX	XXX	XXXX	---	---	---	---	XXXX	---	---	---	-	-	-	-	-	-	-	-	-	-	-	Reference only tree.
XXXXX	NX	0	---	---	---	---	---	---	---	---	---	---	---	-	-	-	-	-	-	-	-	-	-	-	Point with no live tally at OCC2 or OCC3.

ALL POINT NUMBERS ARE N POINTS:

X - Item must be completed

B - Establish OCC2 dbh by boring increment. Record increment between OCC2 and OCC3 in OC3 INC. If a hardwood, estimate OCC2 dbh rather than bore increment.

C - Conifers only. Code as of OCC2 if reconstructed as live at OCC2, but now culturally killed, dead, or harvested.

D - Record current dbh for OCC2 dbh.

H - Measure heights on all normally-formed live trees >12.5 cm dbh on points 1 and 2. Continue measuring heights on normally-formed conifers until 4 conifers >12.5 cm dbh have measured heights. Continue measuring heights on normally-formed hardwoods until 4 hardwoods >12.5 cm dbh have measured heights. Also measure height on 1st live tree >12.5 cm dbh of a species not previously tallied on the plot if normally-formed. Also measure height on live normally-formed live tally that are of largest and smallest dbh >12.5 cm dbh on the plot. If less than 16 live prism tally trees on the plot, measure or estimate height on remaining prism trees without a height.

M - Hardwoods only. Code as of OCC2 if reconstructed as live at OCC2, but now culturally killed, dead, or harvested.

R - Reconstruct the item.

S - Same line number if a mortality tree and a snag are the same tree.

APRIL 16, 1991

FIELD INSTRUCTIONS FOR THE
INVENTORY OF EASTERN WASHINGTON
1991

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I. INTRODUCTION

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I. INTRODUCTION

This manual describes the procedures for field plot measurement used by the Forest Inventory and Analysis (FIA) Research Work Unit in the 1991 inventory of eastern Washington.

The Portland FIA Project of the Pacific Northwest Research Station (PNW), USDA Forest Service is responsible for inventorying the forest resources of the Pacific Coast States (Oregon, Washington, and California).

FIA provides information asked for by resource planners, policy analysts, and others involved in forest resource analysis and decision-making. The data collected by FIA are compiled, analyzed, and published in a variety of statistical and analytical reports that range in focus from subregional to national in scope. Published data include estimates of: forest land area; timber volume; forest growth, mortality and harvest; potential forest productivity; opportunities for silvicultural treatment; area and types of wildlife habitats; and forest area by broad ownership classes and resource zones. FIA also provides data and analyses to answer additional questions concerning the forest resources of the Pacific Coast states as they arise.

A. Purposes of this manual. This manual serves two major purposes:

1. To guide field personnel in how to locate and measure field plots in the 1991 inventory of eastern Washington.

2. To document the field procedures and codes used in the inventory. Documentation is needed by the staff of FIA and by other users of FIA data.

B. The design of the Eastern Washington inventory.

In Eastern Washington, FIA collects forest resource data on all forest lands except National Forests, reserved areas, and census water. Eastern Washington is divided into two sampling units: the Central Washington unit and the Eastern (Inland Empire) Washington unit. The 1991 inventory of Eastern Washington represents the third visit (occasion 3) to a grid of permanent clustered plots by FIA. Plots in the Central unit were installed and measured in 1967; plots in the Eastern unit were established the following year (1967-68: occasion 1). The plots were revisited in 1980 (occasion 2).

1. The primary design--previous and current inventories.

The FIA sample design is based on double sampling with stratification. The primary sample consists of a grid of permanent photo points. During the last inventory of eastern Washington in 1980, land class, and owner class were identified for each photo point. Points classified as timberland were stratified into photo-volume classes. National Forest, reserved areas such as National and State parks, and waterways and bodies of water recognized by the US Bureau of Census were not part of the area inventoried in 1980.

In the 1991 inventory, the permanent grid of primary points is extended into National Forest, reserved areas and census water in eastern Washington; the extended grid enables FIA to better determine sampled area which is defined by the same ownership classes and land use classes used in 1980. Within sampled area, photo points are interpreted for land class, ownership and resource zone. In the Central Washington unit on each point classified as timberland with a pole or sawtimber stand present, an interpreter estimates stand height and density, information that allows stratification into volume classes after field plot volumes are known. Timberland points in the Eastern Washington unit are not stratified for volume due to the low variance in stand conditions. Because the primary points are permanent, area change in land class, ownership and development patterns can be derived for the period between inventories.

2. The field design--previous inventories.

At occasion 1 (1967-68), a grid of 10-point, one acre field plots was established at all timberland grid locations within sampled area. Points were laid out on equilateral triangles measuring 70 feet on a side. At each point, trees under 12.5 cm. d.b.h. were sampled with a 2.1 meter fixed-radius plot and larger trees were sampled using a 40 BAF variable-radius plot. Field plots were not established at field grid locations verified as other forest land with ground land classes of 41, 44, or 46.

At occasion 2 (1980), field crews revisited the field plots installed at occasion 1. One-third of these plots were remeasured and the remaining two-thirds were partially remeasured ("walked through"). In Asotin, Columbia, Garfield, Walla Walla and Whitman Counties, all timberland plots established at occasion 1 were fully remeasured. The crews established new, permanent plots at timberland grid locations where occasion 1 plots could not be found or where the location had entered the inventoried area since occasion 1. At grid locations classified as other forest-oak (GLC=44), temporary plots were measured. At grid locations pi'ed and verified as a ground land classification of 41 (5 plots), 42 (harsh alpine site: one plot), or 46 (one plot), the crews measured a one-point, vegetation profile plot.

The standard plot layout for all revisited plot locations consisted of points 1, 3, 5, 7, and 9 of the 10-point, one acre design. If point 3, 5, 7 or 9 was affected by or fell in a different land class, owner group or stand condition than point 1, the crews substituted an even-numbered point established at occasion 1. On remeasured plots only, new points were installed if no even-numbered points qualified for substitution; new points, unlike substitute points, were not part of the inventory, but were installed only to provide a basis for assessing change at next inventory. New points were numbered starting with 11 (11, 12...).

For timberland plots lost or new since occasion 1, new plots were established using the same 5-point layout and substitution/new point procedures that applied on the remeasured plots. At other forest grid locations qualifying for temporary plots (GLC=44), the crews laid out and measured 5 points using the same remeasured plot layout and procedures.

A number of plots classified as timberland at occasion 1 and 2 were reclassified as other forest during compilation following fieldwork: 69 plots with severe stockability limitations were reclassified as other forest-low site (GLC=49);

20 plots with rocky conditions that precluded regeneration success were reclassified as other forest-rocky (GLC=41); and 4 plots with high water tables were reclassified as other forest-harsh site (GLC=46).

On remeasured plots, the crews accounted for trees live and ≥ 12.5 cm. d.b.h. at occasion 1; these trees were classified as live, dead, harvested or culturally killed. They also sampled for ongrowth trees and for snags with d.b.h. ≥ 22.5 cm. on the 40 BAF variable-radius plot; ongrowth trees were tallied only to assess change at the next inventory. On 2.1 meter fixed-radius plots, the crews accounted for trees recorded as live and < 12.5 cm. d.b.h. at occasion 1. Additionally on the fixed-radius plot, they tallied trees less than 2.5 cm. d.b.h. at occasion 1 but greater than 2.5 cm. d.b.h. at occasion 2--and recorded enough seedlings, if present and needed to assess stocking, to bring the tally of live trees on the fixed-radius plot to four trees. For fixed and variable-radius tally, diameter was measured for all new and remeasured live tally trees, and height was measured or estimated in the field. Trees with diameters measured at occasion 1 and remeasured at occasion 2 were used to calibrate diameter growth equations.

On walk-through plots, the crews accounted for trees tallied as live and ≥ 12.5 cm. d.b.h. at occasion 1, and sampled for snags ≥ 22.5 cm. d.b.h. on the 40 BAF variable-radius plot. Ongoing trees were not sampled. Neither diameters nor heights were measured or estimated in the field for variable-radius tally still alive at occasion 2; these attributes were estimated by applying regression equations calibrated using data for remeasured trees on the remeasured plots. On the walk-through plots, remeasurement and ingrowth procedures on 2.1 meter fixed-radius plots were the same as for remeasured plots.

On new or lost plots, the crews sampled for live, dead, harvested and culturally killed trees ≥ 12.5 cm. d.b.h. and for snags ≥ 22.5 cm. d.b.h. on the 40 BAF variable-radius plots. For live trees, diameter at occasion 1 was estimated by boring and subtracting increment from diameter at occasion 2. On mortality trees and culturally killed trees, the crews recorded diameter at occasion 2; occasion 1 diameters were reconstructed using the diameter growth equations. For harvested trees, average stump diameter was recorded as a proxy for occasion 1 diameter. *Heights were measured or estimated for all live trees at OCC 2 on new or lost plots*

On the 2.1 meter fixed-radius plots, the crews tallied live, dead and culturally killed trees currently 2.5 to 12.4 cm d.b.h.; dead and culturally killed trees had to have been alive at occasion 1 to qualify as tally. Diameters for trees live at occasion 1 were estimated to the nearest 5 cm class. Additional seedlings were tallied, if present and needed, to bring the live tally on the fixed-radius plot to four trees.

On new or lost plots, heights were measured or estimated in the field for all live trees. For mortality trees, the crews estimated occasion 1 heights.

At each point on the temporary other forest-oak plots, the crews sampled live trees ≥ 12.5 cm. d.b.h. and snags ≥ 22.5 cm. d.b.h. within the limiting distance of the 40 BAF variable-radius plot. Trees live and 2.5 to 12.4 cm. d.b.h. were tallied at each point if within a 2.1 meter fixed-radius plot. Diameters to the nearest 5 cm. and heights were field-estimated for all fixed and variable-radius tally. Only point 1 of the five points was referenced.

For all plots, revisited, new or temporary, the crews sampled vegetation profiles by examining a 5-meter fixed-radius plot at each of the five points. At other forest locations not measured using five-point plots, the crews estimated the vegetation profile on a 5-meter fixed-radius plot at the field grid location.

At OCC2, the field crews indicated the presence of nonstockable conditions on timberland and most other forest plots. At each point, they examined the 2.1 meter fixed-radius plot to see if it was more than 75-percent nonstockable. The crews indicated qualifying nonstockable conditions by coding the second character of the point cover class variable; qualifying nonstockable conditions included nonstockable water, sterile soil, compacted soil, and nonforest inclusions.

At OCC2, nonstockable conditions were treated always treated as discounts to productivity (mean annual increment). Timberland acreage was affected only when the presence of nonstockable conditions--as coded point by point--was cause to reclassify a timberland plot as other forest--rocky (GLC 41) or low site (GLC 49). Timberland plots with three or more points coded nonstockable - sterile soil (code 6) were reclassified as other forest--rocky. The MAI obtained from site index measurements was multiplied by the percent stockable area to adjust the mean annual increment on the plot area; the purpose: to recognize the effects of stockability limitations by discounting inherent productivity. It made no difference that some of the conditions termed "nonstockable" were nonforest (area) inclusions; all were treated as discounts from productivity (MAI). Plots with an adjusted MAI of less than 20 cubic ft/acre/yr. were assigned GLC 49 (low site) during the compilation process.

3. Field design--current inventory.

The field design for the 1991 inventory addresses the following objectives: (1) to provide data from which the current status of non-National Forest forest resources in Eastern Washington can be described and analyzed, (2) to provide data to monitor changes in these resources occurring since previous inventories, (3) to provide a design that is no more complex than designs used in other recent FIA inventories, (4) to incorporate as much of the field design from the last (occasion 2--1980) inventory in eastern Washington as possible given objectives 1, 2 and 3, and (5) to initiate the inventory of course woody debris.

In the 1991 inventory (occasion 3), FIA is reinventorying timberland and other forest plots visited at occasion 2. Crews are fully remeasuring these 5-point, one acre plots; none are partially remeasured (walked through) as was done at occasion 2. New, permanent 5-point plots will be established at field grid locations classified as timberland or as other forest-rocky, oak, unsuitable site, or low site (1) if the occasion 2 plot can not be found, or (2) if the grid location was missed but was in sampled area at occasion 2 and is in at occasion 3, or (3) if the location has become sampled area since occasion 2. Additionally, permanent 5-point plots will be established at grid locations classified as other forest-oak and at grid locations photointerpreted and field-verified during the occasion 2 inventory as other forest-rocky (OCC2 GLC=41; 5 plots) or other forest-unsuitable site (OCC2 42 or 46; 2 plots) provided that these locations can be safely visited. At other forest grid locations too steep and hazardous for 5-point other forest plots, the crews are installing or remeasuring one-point plots to sample vegetation profiles and area attributes.

The basis for plot layout on remeasured plots is the 5 points measured at occasion 2. The crew will select and reconstruct an alternative point if an occasion 2 point center is within 10 meters of the following: nonsampled area (National forest, reserved areas, census water or area outside of eastern Washington), or a different land class or stand condition--undisturbed or clearcut--than is present at the field grid location (point 1 at occasion 2). Additionally, the crews will select and reconstruct an alternative point if any live tally at occasion 2 or 3 falls within these conditions. When these situations are encountered, the crews will apply the point substitution rules used at occasion 2. In the current inventory, points are never moved, only substituted.

For timberland and other forest plots (OCC3 GLC=20,41,44,46,49) lost, missing or new since occasion 2, the crews are installing and reconstructing plots that are laid out on the standard 5-point pattern. Reconstructed means that the plot is backdated to reflect tally "in" and live at OCC2. Points are substituted (but not moved) to keep point centers at least 10 meters within, and all tally within sampled area and within the same land class, broad owner class and stand condition that is present at the field grid (pinpricked) location. Occasion 2 substitution rules apply.

On remeasured points on 5-point plots, the crews are accounting for trees tallied as live and ≥ 12.5 cm. d.b.h. at occasion 2; these trees are classified as live, dead, harvested or culturally killed. Snags tallied at occasion 2 are also accounted for. The crews are also sampling on the 40 BAF variable-radius plot for live ongrowth trees ≥ 12.5 cm dbh and for new snags with a diameter ≥ 22.5 cm. and a height of ≥ 2 meters. On 2.1 meter fixed-radius plot, the crews are accounting for trees recorded as live and < 12.5 cm. d.b.h. at occasion 2. Additionally on the fixed-radius plot, they are tallying trees less than 2.5 cm. d.b.h. at occasion 2 but now greater than 2.5 cm dbh and are recording enough seedlings, if present and needed to assess stocking, to bring the tally of live trees on the fixed-radius plot to four trees.

On these remeasured points, current diameter is measured on all new and remeasured live tally trees. On points "walked-through" at OCC2, the crews are boring for increment to reconstruct OCC1 diameter on trees tallied live and ≥ 12.5 cm dbh at OCC2 if OCC1 diameter is greater or unreasonably less than the OCC3 diameter. On points fully remeasured at OCC2, the crews are boring for increment to reconstruct OCC2 dbh on trees tallied live and ≥ 12.5 cm dbh at OCC2 if OCC2 diameter is greater or unreasonably less than OCC3 diameter. (On points "walked-through" at OCC2, diameter on trees tallied live at OCC1 and 2 with OCC1 diameter ≥ 12.5 cm were estimated by regression.)

On the 5 points selected on lost, missing and new plots and on substituted points on remeasured plots, the crews are sampling on a 40 BAF variable-radius plot for snags ≥ 22.5 cm dbh and at least 2 meters tall and for live, dead, harvested and culturally-killed trees that were live and ≥ 12.5 cm. d.b.h. at occasion 2. On live trees, they are reconstructing occasion 2 diameter by boring and subtracting increment from current (measured) diameter. On mortality trees and culturally-killed trees, the crews are recording current diameter as diameter at time of death. For harvested trees, average stump diameter is used as a proxy for diameter at harvest.

On the 2.1 meter fixed-radius plot on these new points, crews are sampling live, dead and culturally killed trees currently 2.5 to 12.4 cm d.b.h.; dead and culturally killed trees had to have been alive at occasion 2 to qualify as tally. Additional seedlings are tallied, if present and needed, to bring the live tally on the fixed-radius plot to four trees.

On all 5-point plots, remeasured, lost, missed or new, height is measured or estimated in the field for all live tally trees on the 2.1-meter fixed-radius plots. If present, one live fixed-radius tree ≥ 5 meters tall must be measured for height on each point. On the variable-radius plots, the crews are measuring height on all live trees ≥ 12.5 cm dbh on the first two points. If, after the first two points, less than four normally-formed conifers ≥ 12.5 cm dbh and less than four normally-formed hardwoods ≥ 12.5 cm dbh have measured heights, the crews will continue to measure heights until these requirements are met. (On plots with light to moderate tally, crews are encouraged to measure or estimate heights on the remaining trees). For trees ≥ 12.5 cm dbh without heights recorded in the field, we will estimate heights with a regression equation; the equation will be calibrated plot-by-plot using the normally-formed tallied trees with measured heights > 5 meters.

On all 5-point plots, remeasured, lost, missing, or new, the crews are sampling vegetation profiles. The crews will examine a 5-meter fixed-radius plot at each of the five points. On remeasured plots, the crews are updating vegetation profiles estimating for shrub and herbaceous layers at last inventory; updates are made when a new species has appeared, when a species recorded at last inventory has disappeared, or when a species recorded at occasion 2 has increased or decreased in coverage by at least 20-percent. At other forest locations that are one-point plots: steep and hazardous GLC=41's, 44's and 46's, crews are estimating the vegetation profile on a 10-meter fixed-radius; on the these one-point plots, the presence and extent of tree species of all sizes is recorded in addition to herbaceous and shrub species.

At each point of a 5-point plot and on the one-point plots, the crews are collecting additional information on a 10-meter fixed-radius plot. This information describes aspect, slope, the extent of nonstockable area, and the extent of root disease identified by pathogen.

On forest plots new to the inventory and on plots having an adjusted OCC2 GLC of timberland, the crews will diagram, label and estimate the percentage of nonstockable conditions separately by point. They will do this by examining the 10-meter fixed-radius plot at each point. The percentage of nonstockable conditions will be used to discount potential productivity.

We are initiating the inventory of dead and downed wood--course woody debris (CWD)--in eastern Washington on 5-point plots. This is done through line transect sampling. Four 10-meter line transects are established off of each of the five points. A piece of CWD intersected by a transect is tallied if the intersected portion is at least 1 meter long, has a minimum diameter of 12.5 cm and is of decay class 1 through 4. Tallied pieces are referenced by measuring the distance from point center to the transect intersection with the piece. If the piece is in decay class 1 through 3, it will receive a diameter nail at point of intersection. For each tallied piece, the crews will record species, small-end, large-end and intersect diameters, length, decay class, orientation to the slope, number of pieces contacted and whether or not the piece is hollow.

We are also collecting information on CWD in piles created by human activities that falls within 10 meters of a point; for such cases, we will record the average length, width and height of the pile, and the proportion of the pile that is within 10 meters of the point.

Plot-level information is also collected or updated by the crews. This data includes site trees, plot aspect, plot slope, distance to the nearest stream from the field grid location, classification of the nearest stream, soil depth, assessment of current grazing impact, presence of hardwood site, kind and date of harvests before and since last inventory, and kind of silvicultural activities occurring since last inventory.

C. Additional sources of documentation. More information on the procedures followed in the 1991 inventory of eastern Washington are on file at the FIA office in Portland, Oregon:

1. Field instructions for the inventory of eastern Washington--1980.
2. Photointerpretation manual for the inventory of eastern Washington--1990.
3. Ownership manual for the inventory of eastern Washington.
4. Complete documentation for the inventory of eastern Washington.
5. Eastern Washington inventory techniques manual--1980.

D. Safety. Personnel working in the field are subject to many safety hazards. Each person must always be conscious of these hazards to avoid accidents. **DON'T TAKE CHANCES! ELIMINATE HORSEPLAY AND CARELESSNESS! THINK SAFETY!** Remember: no task is more important than personal safety!



1. Safety in the woods:

- a.) Wear protective clothing. Long-sleeved shirts, long pants, and gloves may protect you from contact with cutting brush and rocks, poison oak, and stinging insects. Trouser legs should be loose enough to avoid binding or cramping, and should not have cuffs. Wear a hardhat at all times in the woods. During hunting seasons wear bright red or orange clothing.
- b.) Wear good quality boots with good traction. For example: 8-inch high leather work boots with lug-soles (Vibram soles).
- c.) Walk, don't run in the woods. Take your time and plan your route. Avoid plunging through the brush. The best route of travel may not be the shortest. Routes across brushy, irregular terrain with rocks and down logs can be hazardous.
- d.) Be watchful of twigs and branches which may cause eye injury. Be especially alert when stepping up to trees which retain their small dead twigs. Keep a sufficient distance behind the person ahead of you to avoid being slapped by branches.
- e.) In heavy undergrowth or slash, lift knees high to clear obstacles. Slow down and watch your step.
- f.) When contouring a steep slope, do not lean into the hill. This tends to loosen footing. Erect posture or slightly leaning out gives more secure footing.
- g.) Know how to fall to avoid hard impacts. Keep flexible with knees slightly bent. If you feel yourself slipping, pick a landing spot. "Do not" stick your arms out to break a fall. Roll with the fall. Try to take the impact on the side of your body rather than your back.
- h.) Don't take chances by walking across ravines, etc., on small logs.
- i.) Bee aware. Keep an eye out for yellow jacket and hornet activity. Yellow jackets nest in the ground, often in well-decayed logs. Yellow jackets are particularly active (nasty) during late summer and early fall when forest conditions are very dry. Hornets nest above ground in "paper" nests that are suspended from branches; woe befalls the forest worker who unwittingly bumps his or her head against a nest, or shakes the sapling from which a nest is suspended. If allergic to insect stings, carry medication to counteract the effects of stings.
- j.) Be alert to rattling or buzzing noises. Look before putting your hands or feet on or under rocks and logs. Be alert as you walk in snake-infested areas.
- k.) After contact with poison oak, remove clothes carefully, wash exposed areas with cool, soapy water, and wash clothes before wearing them again.

- l.) Keep someone posted as to where you plan to work each day, particularly on long hikes into the forest, so that if you do not return in a reasonable time, someone can find you.
- m.) Hand axe. Carry it in the sheath except when actually using it.
- n.) Keep your individual first-aid kit completely supplied, and know how to use it. Treat all wounds promptly. See that a completely supplied large first-aid kit is in each vehicle.
- o.) Carry matches and possibly a small flashlight. On very long hikes, take extra food, clothing, and matches so if you are caught out in the woods at night you will be reasonably comfortable. Never build fires in forest duff or leave a campfire until it is dead out.
- p.) Check yourself for ticks. The beasties bite and are carriers of Lyme disease.

2. Safety on the road: It all pays the same, so drive with care, with courtesy regardless of others' actions, and with common sense.

- a.) Seatbelt use is required in all government-owned or leased vehicles, and it is the law in the State of Washington. Do not ride in the back of pick-ups.
- b.) DRIVE DEFENSIVELY! Expect the other person, whether vehicle or pedestrian, to do the worst thing and be prepared. Observe all speed regulations and traffic signs.
- c.) Do not drive when you are sleepy, taking medication, or when other personal conditions make it unsafe to drive a vehicle. Get someone else to drive or, if alone, stop driving and nap (out of the public view).
- d.) Always drive with your headlights on. This practice increases the visibility of your vehicle. It is particularly important when driving in fog, on dusty roads, traveling in and out of shadows, and any other low light/visibility situations. Turn lights off when you park the vehicle.
- e.) Do not operate a vehicle in an unsafe condition. Check your vehicle frequently to keep it in good mechanical condition. Lights, horn, steering, and brakes should be kept in proper adjustment at all times. Make necessary repairs as soon as unsafe condition develops. Check canopy attachment often. Report any unsafe conditions to your supervisor.
- f.) Keep the vehicle clean; windows, mirrors, and lights should be kept clean and free of obstructions to increase visibility; keep cab and driver area clean so material is not rolling under pedals or otherwise distracting the driver.
- g.) When descending long steep grades shift to a lower gear at the beginning of the grade.

- h.) Adjust vehicle speed to the driving conditions. Wet, icy, or snowy roads and decreased visibility require decreased speed. Be aware of speed when changing from one type of road to another, i.e., Freeway to secondary highway to gravel and adjust speed accordingly.
- i.) When following other vehicles allow at least three seconds of travel distance between yourself and the vehicles ahead. Under slippery road conditions and poor visibility allow more distance.
- j.) Be aware of your vehicle's idiosyncrasies and adjust your driving accordingly.
- k.) When driving on privately-owned log-haul roads, be alert for heavily loaded trucks moving at high speeds. Observe all traffic control signs, particularly signs requiring you to drive on the LEFT side of the road.
- l.) When backing up walk around your vehicle to check for hazards and use a spotter to guide you.
- m.) Do not drive and navigate at the same time. If the driver needs to look at maps and photos, stop at a safe place, then look at them.
- n.) Watch for animals on the road. Most hooved animals travel in groups, so where there is one, assume there are many, with all just itching to jump out in front of your vehicle. Stop and let the animal move off the road, look for others to follow, then proceed on. If you can not stop in time to avoid hitting an animal, it is generally better to hit it, than to go off the road or hit another vehicle.
- o.) Park your vehicle so that it does not pose a hazard for other drivers. Do not park where dry grass or other potential fuels come in contact with your vehicle's hot exhaust system.
- p.) Keep as far right as is safely possible on blind curves on logging roads. If the curve is blind and less than two lanes wide, slow way down and be ready to take evasion action.

3. What to do if injured:

- a.) Treat the injury promptly; if immediate medical attention is required, go directly to a hospital emergency room. Try to make contact with your supervisor or the office to get instructions and assistance. Make sure the doctor fills out his/her part on the CA-1 form.
- b.) Inform your supervisor of all injuries and ask which, if any forms, need to be filled out. Supervisors must inform the office at the earliest opportunity.
- c.) Fill out Federal accident forms completely, with signatures, and make a copy for your personnel records. Give the forms to your supervisor and they will check for mistakes, fill out their section, and send them to the appropriate person.

- d.) If you are in multi-vehicle accident, provide other parties with enough written information so that they can easily get in touch with you, your crew supervisor, and the office. In turn, you must get the following information from all involved parties and witnesses: names, addresses, phone numbers, vehicle license numbers, driver's license numbers, insurance company names and policy numbers, and police report numbers. If possible, do not admit responsibility without first contacting your supervisor.

INJURIES: 1990 FIELD SEASON (WESTERN WASHINGTON)

4 INJURIES FROM SPORTS DURING TRAINING SESSION. (3 Volleyball, 1 Frisbee)

2 INJURIES DUE TO DISEASE: 1 Giardiasis and 1 Tick bite

9 WORK-RELATED INJURIES

7 Trips and falls. Resulting in:

4 Ankle injuries

1 Fractured rib from increment borer.

1 Scratched eye

1 Head injury

1 Back injury from lifting boxes.

1 Thumb smashed with hatchet while hammering in a DBH nail.

In addition to preceding injuries, there were a number of accidents that resulted in vehicle or canopy damage.

II. PLANNING TRAVEL AND LOCATING THE PLOT

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II. PLANNING TRAVEL AND LOCATING THE PLOT

A. Before leaving base camp.

- (1) Make sure the landowner has been contacted (see section below on landowner contact).
- (2) Plan the route to the plot. Always select two or more extra plots to take along.
- (3) Leave word of your plot locations and expected destinations.
- (4) Make sure your vehicle has all of the necessary equipment and a plot map.
- (5) Reach agreement with your partner(s) on a work procedure.
- (6) Inspect vehicle prior to departure.

B. Checklist of items needed on plot.

OCC1 plot records and photos (OCC 2 & 3 plot records & photos, root rot sheet, residue pile tally sheet, spare CWD tally sheet)

Hand-held data recorder & extra batteries (AA)

Pencils

Note pad

DATA RECORDING

Calculator

Tatum and tatum aids

Field manual & Data recorder manual

Plant guide

Plot (road) map

Master grid list

Stereoscope (2x and/or 4x)

Photo scale (Timber Survey Aid #16))

Straight edge

PHOTO INTERPRETATION

Pinprick

Hand lens

Prism

Compass

Clinometer

Diameter tape

PLOT MEASURING

30-meter tape

Hand axe

Increment borer

Paper bags for root disease samples

B. Checklist of items needed on the plot

Cedar stake	
Steel plot pins	
Nails	
Tree number tags	PLOT REFERENCING
Square tags	
round tags	
Flagging	
First aid kit	FIRST AID
Bee sting and/or snake bite kits	
Canteen	
Lunch	MISC. PERSONAL
vest, hardhat, rain gear and extra clothing	

C. Landowner contact. During ownership collection, the name and address of each landowner was collected from county courthouse records.

1. Landowners of small tracts. In preparing for the field season, the Portland office sent each landowner of privately-owned, non-timber industry plots (owner class codes 41 and 61) a letter describing our inventory and asking permission to measure the plot. We enclosed a signed release letter and a self-addressed postcard for their reply with each letter. An example of this correspondence is in Appendix 2A and 2B.

Either written or verbal permission must be obtained before a plot is measured that has an owner code of 41 or 61. This responsibility lies either with the field coordinator, crew supervisor or the field crew. Information useful for owner contact has been recorded on a 3 X 5 card inserted in the plot jacket if the owner has responded to our letter. If there is no owner response, the owner name and address from courthouse records will be listed on a printout. Notes from any phone conversations with landowners or circumstances such as locked gates or washed-out roads, will be noted on the plot attribute record under Interactive Items.

2. Landowners of large tracts. Owners of large forested tracts--primarily private timber companies and public agencies--are contacted individually from the Portland office and/or by field personnel at company or agency offices.

3. Harvest information. If possible during landowner contact, inquire whether harvesting has occurred since the occasion 2 inventory. If harvesting has occurred, ask in what year harvesting occurred.

D. Plot location aids.

Each field crew should have a road map covering the general plot area and a plot packet for each plot you plan to visit. The plot packets, which were assembled in the Portland office for each field plot, contain: the OCC1, 2 and 3 plot cards and photos; computer-printed plot and point attribute records; computer-printed tree tally records (trackable tree tally records listing standing dead and live trees at OCC2); and point mapping record.

Use road maps, plot cards and aerial photos from OCC1, 2, and 3 to locate the plot. The county, plot number, and legal description (township, range, section, and forty) are printed on the master grid list and on a label pasted on the OCC3 plot card. Plot locations are marked and numbered on the plot map. Use the plot map to reach the general vicinity of the plot by vehicle. Once you have reached the area covered by the photos, use the photos to find the exact plot location on the ground.

For remeasurement plots (sample kinds 2 and 7), the field grid location (point 1 at OCC2) is pinpricked and circled on the OCC2 photos. The plot number is marked in the upper right-hand corner on the front of the old photo, and on the back of the photo near the circled pinprick. Many of the OCC1 photos have true azimuth and photo scale on the back of the photos. The plot number is also marked on the upper right-hand corner of the new photos. For remeasured plots, the OCC2 plot card has a section "Route to RP" which sometimes provides information useful for locating the plot.

For new plots (sample kind 4), the field grid location is pinpricked and circled on the OCC3 photos. The plot number is marked in the upper right-hand corner and on the back of the photo near the circled pinprick.

E. Locating the plot on the ground.

1. Previously measured plots. When revisiting established plots (sample kinds 2 and 7), use both new and old photos to proceed to the plot area. It is often easier to use the OCC3 photos to arrive at the general location and the OCC1 and 2 photos to find the exact location of the plot. It is generally easier to locate an established plot by heading directly to the plot center rather than to the RP. The reason: the RP is a single tree with a couple of tags, whereas within the plot area are several to many trees with reference tags, tree numbers and/or diameter nails; in short, more "signs" to detect. In searching out the plot, you may find a tagged/numbered tree on one of the sample points--use the OCC2 plot card to determine which sample point you are on. Note: on the OCC1 plot card, the azimuths recorded for point 1 reference trees are from tree to point.

The RP tree has square aluminum tags on two sides of the tree, 2 meters above ground line, and one square aluminum tag below stump height facing towards the field grid location. If needed, travel notes, remarks, and a description of the RP trees can be found on the front of the OCC2 tally sheet and the back of the OCC2 photo. Before beginning the traverse from the RP to the plot, check the photos to see if the azimuth and distance seem reasonable. Some photos will be marked with a point-of-departure (POD). They are usually near a road and indicate how the crew arrived at the plot area.

If you are having difficulty finding the plot, follow these steps:

a.) Return to the last known point on your route into the plot. Plan a route to the pinpricked field grid location; divide the route into stages with a identifiable physical feature at the end of each stage that you can identify on the photos and can find and confirm on the ground. Proceed stage by stage, never embarking on the next stage until you know without a doubt that you have identified the endpoint of the previous stage. The endpoint on the last stage is the pinpricked location with its referenced trees.

b.) If you tracked your way into the plot area but you find any signs of the plot, look for stream confluences, ridges, openings, groups of large trees, old skid roads, large snags etc. on the ground, to reconfirm without a doubt that you are at the pinpricked location.

c.) Still no plot? Try to locate the area that previous crews might have been when they thought they were at the pinpricked location. Check the OCC2 plot card for information such as:

(1) Remarks which say "Point center moved back 20 feet on same azimuth to agree with photo pinprick."

(2) Stand type and size of trees. If the plot is in large sawtimber stand of fir, the crew would know they were off if they were in a pole stand of pine.

(3) The size and species of the RP and point 1 reference trees.

(4) Direction of travel from the RP--it could be 180 degrees off.

(5) Any other indicator such as slope and aspect.

2. New plots.

a.) Locating a plot by inspection. For plots established at OCC2, and that have no previous photo coverage, use the OCC3 photos to proceed to the pinpricked field grid location by photo interpretation. If a crew ground-checked the plot at OCC2, they may have recorded information on the OCC2 plot card which may be helpful in relocating the plot. When you reach the point you believe is the pinpricked location, carefully check the photos against the surrounding terrain and vegetation to make sure you are in the correct spot.

b.) Locating a plot with an RP and baseline. You may encounter a plot that is difficult to locate using photo interpretation. In this case you may establish a baseline on the OCC3 photos to determine true photo azimuth and scale. Once the baseline is established:

(1) Select, tag, pinprick, and measure a reference point (RP) preferably within 200 meters of the pinpricked field grid location (see page 33 for instructions on RP).

(2) On the photos, draw a straight line between the RP and pinpricked location.

(3) Determine the azimuth and distance from the RP to the pinpricked location using a Timber Aid 16 or a scaled ruler and a protractor.

(4) Measure out the calculated azimuth and distance to the pinpricked field grid location and flag it. Carefully check the photos against the surrounding terrain and vegetation to confirm you are actually at the pinpricked field grid location. When the pinprick location on the ground is verified, mark it with a cedar stake.

F. Plots with active logging.

If you arrive at a plot location and find the area is being logged (timber has been or is being felled, bucked, or yarded), DO NOT ESTABLISH THE PLOT. Note on the plot jacket the status of the logging operation and return the plot to the crew supervisor. The crew supervisor will hold the plot until logging activity is completed.

III. PLOT AREA IDENTIFICATION

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III. PLOT AREA IDENTIFICATION

A. Determine if plot is in the inventory unit. Prior to the field season, the office staff has attempted to confirm that all plots are within sampled area. Nevertheless, before establishing, remeasuring, or classifying a plot in the field, confirm when possible that the field grid location is in sampled area. (See page 33 or 160 for discussion on the field grid location). A plot is in nonsampled area--out-of-inventory--if any of the following statements is true:

1. The field grid location is on National Forest land.
2. The field grid location falls in an area that is reserved from timber harvest by law or official policy. Nature Conservancy lands and National and State parks are included, as are most County and Municipal parks.
3. The field grid location falls in Census water.

(if not true)
Measure the plot ~~unless~~ ^{if not true} one of these three criteria is clearly true. Write the reason for any discrepancy in the "Contact Office About" section on the plot attribute record and the plot jacket. Before leaving the plot area, check to make sure the pinpricked location on the OCC1, 2 and 3 photos agrees with the ground location of the plot. Upon completion, forward the plot to the inventory leader for review.

If the field grid location is in the inventory unit, but part of the plot falls in nonsampled area, see instructions on plot layout starting on page 37.

B. Plot area identification items. Items 1-10 on the plot attribute record must be completed for all plots (see the tally guide for the plot attributes on page 45). Many items have been printed by the computer; others need to be completed by the field crew. Use the following guidelines to complete the area identification items.

1. Item 1--County. This 3-digit code, printed/downloaded by the computer, identifies the county in which the plot is located. Listed below are the county codes, magnetic declination by county, and the survey unit by county.

Central Washington unit (CW) or the Eastern Washington unit (EW).

<u>CODE</u>	<u>COUNTY</u>	<u>DECL</u>	<u>EAST</u>	<u>UNIT</u>	<u>CODE</u>	<u>COUNTY</u>	<u>DECL</u>	<u>EAST</u>	<u>UNIT</u>
001	Adams 74	21		EW	039	Klickitat	20	1/2	CW
003	Asotin	20		EW	043	Lincoln	21		EW
005	Benton 47	20	1/2	EW	047	Okanagon	22		CW
007	Chelan	21	1/2	CW	051	Pend Oreille	21	1/2	EW
013	Columbia	20		EW	063	Spokane	21		EW
017	Douglas	21	1/2	CW	065	Stevens	21	1/2	EW
019	Ferry	21	1/2	EW	071	Walla Walla	21	1/2	EW
021	Franklin 69	20	1/2	EW	075	Whitman	20		EW
023	Garfield	20		EW	077	Yakima	21		CW
025	Grant 94	21		EW					
037	Kittitas	21	1/2	CW					

2. Item 2--Plot number. 3-digit code, printed by the computer. The printed/downloaded OCC3 plot number is the same as the OCC2 plot number.

3. Item 3--Sample kind. 1-digit code, assigned in the office and printed/downloaded by the computer, which may be changed in the field. The sample kind for a plot is based on the ground land use of the plot location at OCC2 and 3, on whether the plot was established before OCC3, and on whether an established plot can be relocated. Sample kind serves three purposes:

a.) It tells the field crew what type of field work is required at a particular plot location (see the tally guides for the plot and point attribute records and the tree tally sheets, Appendices 8 and 9).

b.) It tells the data compilation section how to process the plot in the office by indicating what kind of plot data was collected by the field crew (e.g. a 5-point plot fully or partially measured at last inventory, a 5-point plot established during the current inventory, a one-point, vegetation profile plot.)

c.) It is used to program data editors which are used to check the accuracy and completeness of field data collection.

<u>CODE</u>	<u>SAMPLE KIND</u>	<u>DESCRIPTION</u>
2	5-point remeasurement fully remeasured at OCC2	A plot based on the 5-point layout. Fully measured at OCC2. Field grid location is on forest land in sampled area at OCC2 and OCC3. <i>Includes plots new at OCC2</i>
4	5-point lost or missed; reconstructed at OCC3	A plot based on the 5-point layout. Fully measured or walked-thru at OCC2, but not found at OCC3. Or: a plot based on the 5-point layout was not measured or walked-thru at OCC2, but should have been. Field grid location is on forest land in sampled area at OCC2 and OCC3.
4	5-point new; reconstructed at OCC3	A plot based on the 5-point layout. Plot was not forest land within sampled area at OCC2, but is at OCC3. Includes forest land entering sampled area since OCC2 with GLC=20, 41, 44, 46, or 49. —
7	5-point remeasurement; walked-thru at OCC2	A plot based on the 5-point layout. Walked-thru at OCC2. Field grid location is on forest land in sampled area at OCC2 and OCC3.
8	1-point	A 1-point vegetation profile plot measured at OCC2 and remeasured at OCC3. Or: a 1-point vegetation profile plot established at OCC3. Field grid location is on other forest land in sampled area at OCC3.
9	Nonforest	No plot established; OCC3 GLC=61-69, 92.
0	Out of inventory at OCC3	Plot was in sampled area at OCC2 but is not at OCC3.
5	ACCESS DENIED; NO HARVEST SINCE OCC2	Plot is PROTECTED
6	ACCESS DENIED HARVEST SINCE OCC2	(21) Plot is PROTECTED

You should accept the office-assigned sample kind UNLESS you encounter one of the following situations:

a.) A plot assigned a sample kind 2 or 7 cannot be relocated (i.e. it is a lost plot). A plot of this type becomes a sample kind 4. Plots on which the field grid location has been clearcut since OCC2 inventory remain a sample kind 2 or 7 even if the points measured at last inventory can not be found; the crew should attempt to relocate and reestablish OCC2 points now in the clearcut in order to remeasure vegetation profile plots measured at OCC2.

b.) The ground land use of a plot assigned a sample kind 8 or 9 in the office is found to have been misclassified at OCC2 and is a GLC 20. The plot becomes a sample kind 4.

c.) A plot assigned a sample kind 2, 4 (lost or missing), or 7 is found to be nonforest: a sample kind 9. This condition may result from misclassification at OCC2, from definition revisions since OCC2, or from a real conversion from forest to nonforest. If misclassified at OCC2, correct OCC2 GLC to match OCC3 GLC on the hardcopy plot attribute card and return the plot to the lead analyst for immediate review.

d.) If a plot with an office-assigned sample kind 9 has become forest land since occasion 2, use the following guide to select the correct sample kind:

- If the true ground land class=20: sample kind=4,
- If the true ground land class=41: sample kind=4 (8 if steep and hazardous)
- If the true ground land class=44: sample kind=4 (8 if steep and hazardous)
- If the true ground land class=46: sample kind=4 (8 if steep and hazardous)

If you encounter one of these situations described in a. thru d., update the sample kind on the plot attribute card. Describe on the plot attribute record the reason for the change, and indicate in the "Contact Office About" section.

4. Item 4--Owner class. 3-digit code, printed by computer for all plots. The code indicates the broad ownership class of the plot. Ownership data were collected in the county courthouse prior to field data collection. The data are used in compiling forest statistics. If evidence indicates the printed/downloaded owner class is incorrect, circle "NO" in "Owner class correct?", note the source of information and the updated owner class in the space provided by the field coordinator).

OWNERSHIP CODES

07	National parks, monuments, and other federal	}	(Reserved)
08	The Nature Conservancy and The Audubon Society	}	"
09	Indian	}	"
10	Bureau of Land Management	}	"
12	Bureau of Land Management (BLM)	}	(Public)
14	Miscellaneous (all other) federal	}	"
15	State owned (other than DNR)	}	"
16	County and municipal	}	"
17	Washington Department of Natural Resources (DNR)	}	"
18	State	}	(Reserved)
19	County and municipal	}	"
21	Forest industry (with mill)	}	(Private)
41	Farmer owned	}	"
61	Miscellaneous private	}	"
71	Like forest industry	}	"
98	Census water	}	
621	Colville National Forest (NF)	}	(Public)
603	Gifford Pinchot National Forest	}	"
605	Mt Baker-Snoqualmie National Forest	}	"
608	Okanagon National Forest	}	"
614	Umatilla National Forest	}	"
617	Wenatchee National Forest	}	"
104	Kaniksu National Forest	}	
800	Indian, allotted land	}	(Private)
801	Colville tribal land	}	"
802	Spokane tribal land	}	"
803	Kalispell tribal land	}	"
824	Yakima tribal land	}	"

5. Item 5--Date of OCC3 inventory. Record a 4-digit code. The first 2 digits refer to the month; the second 2 digits refer to the year. Use the following coding system:

EXAMPLE: June 1991
would be coded "0691".

6. Item 6--Date of OCC2 inventory. 4-digit code printed/downloaded by computer. Indicates the month and year of the OCC2 inventory. Uses the same codes as Item 5.

7. Item 7--OCC3 ground land class. 2-digit code that describes the ground land class (GLC) of the pinpricked field grid location. GLC is used to make forest area estimates and to confirm the land class of each field grid location.

The OCC3 GLC is the same as the OCC2 GLC unless a real GLC change occurred since OCC2. Such changes are often detected during photo interpretation or plot screening and are indicated on the plot attribute record.

The field crew should record an OCC3 GLC that differs from OCC2 if they can verify that an actual, physical change occurred since the OCC2 inventory. If a change has occurred since OCC2, describe the nature of the change in "Contact Office About" on the plot attribute record. The lead analyst will review the plot.

Plots measured with a 5-point plot at OCC2 that have an OCC2 GLC=41 or 49 will retain the same GLC at OCC3 unless converted to nonforest since OCC2; if one of these ground land classes are questionable, describe why the ground land use is doubtful on the plot attribute record in "Contact Office About". DO NOT CHANGE THE OCC2 OR OCC3 GLC IN THESE CASES. The lead analyst will review the plot.

Ground land classes: The GLC codes are:

Code	Ground land class-forest	(For definitions, see page 30)
20	Timberland	
41	Other forest-rocky	(please note preceding paragraph)
44	Other forest-oak or other hardwoods	
46	Other forest-unsuitable site (bogs, sites with high water tables, harsh alpine sites, etc.)	
49	Other forest-low site	(please note preceding paragraph)
	<u>Ground land class-nonforest</u>	
61	Cropland	
62	Improved pasture	
63	Natural rangeland or abandoned farmland	
64	Other farmland including farmsteads	
65	Marsh	
66	Cultural nonforest stringers - constructed roads, powerlines, pipelines, and railroads.	
67	Urban - townsites and areas of clustered suburbs, residential industrial buildings.	
68	Naturally nonvegetated - barren rock, sand, and glaciers.	
69	Christmas tree lands, nurseries	
92	Water - includes lakes 0.4-16 ha and streams 10-200 meters wide.	

8. Item 8--OCC2 ground land class. 2-digit code printed by the computer, using the same codes as in Item 7. This is the ground land class at OCC2. If the OCC2 (or OCC1) GLC classification is questionable, code Y in "OCC1/OCC2 GLC UPDATED?" and write the reason why in "CONTACT OFFICE ABOUT" on the plot attribute record.

Plots measured with a 5-point plot at OCC 2 that have an OCC2 GLC=41 or 49 will retain the same GLC at OCC3 unless converted to nonforest since OCC2; if one of these land classes is questionable, describe why on the plot attribute record in "Contact Office About". DO NOT CHANGE THE OCC2 OR OCC3 GLC IN THESE CASES. The lead analyst will review the plot.

9. Item 9--Forest Land Stratum. 2-digit code printed on the plot attribute record. This is the classification made by the photo interpreter and is not a field entered item. FLS is never changed in the field. If the photo is mispinpricked, indicate in Interactive Items, correct the pinprick, and note in "Contact Office About" whether re-PI is necessary. If so, the plot will be re-PI'ed and FLS will be updated in the office by the data manager.

Code Description

Timberland

- 21 Clearcut since OCC2
- 23 Not clearcut since OCC2; conifer density < 25% at OCC3
- 25 Not clearcut since OCC2; conifer density \geq 25% at OCC3

Other forest

- 41 Other forest, rocky
- 44 Other forest, oak-madrone
- 46 Other forest, unsuitable site
- 49 Other forest, low productivity

Nonforest

- 60 Nonforest at occasion 2 and occasion 3
- 71 Nonforest, agriculture, at occasion 3; timberland at occasion 2.
- 72 Nonforest--cultural stringer at occasion 3, timberland at occasion 2.
- 73 Nonforest--urban at occasion 3, timberland at occasion 2.
- 74 Nonforest--noncensus water at occasion 3, timberland at occasion 2.

10. Item 10--PI Direction. 2-digit code printed on the plot attribute record describing the direction that the point was photo-interpreted.

C. Ground Land Class--Definitions and classification rules.

1. Area, width and length requirements:

All land class areas must be at least 0.4 hectares (4000 square meters) or larger and 35 meters wide to be recognized, except:

a.) Cultural nonforest stringers (constructed roads, railroads, powerlines, pipelines, and canals) 0.4 hectares or larger are nonforest. There is no minimum width required.

b.) Streams 10 or more meters wide and 0.4 hectares or larger are nonforest. A 10-meter wide stream must be at least 400 meters long to be 0.4 hectare (4000 square meters) in size.

c.) Maintained structures are always nonforest, even when the structure and surrounding site is less than 0.4 hectares. Isolated pumphouses, sheds, and other structures in forested areas are not considered "maintained structures" if the primary use of the area is forest.

Whenever the point falls in an area less than the minimum recognized, the area will be classed like the most similar adjacent land class.

Constructed roads are made for car or truck travel. They are used "to get somewhere" and not to skid logs. They are made using machines other than cars or trucks.

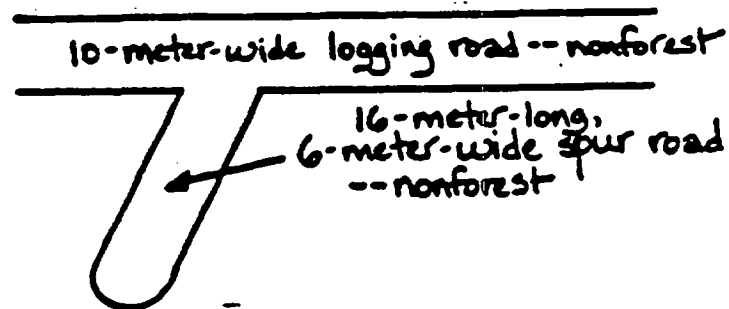
Cutbanks along constructed roads are classified as part of the road regardless of the type and size of the vegetation present. "Cutbanks" include engineered "cut" or "fill" areas where the original topography has been modified during roadbuilding.

Measure the width of cultural nonforest stringers and streams as the average width of stringer above and/or below point 1. For 5-meter-wide stringers, look at 800 meters of stringer; for 10-meter-wide streams look at 400 meters; for natural stringers (which have to be 35 meters wide) look at 114 meters. The point can be anywhere within this specified length of stringer. All forks of constructed roads, streams, etc. are nonforest regardless of length (see figure below). A fork of a constructed road connected to other area that qualifies as nonforest is nonforest regardless of length. The same rule applies to railroads, streams, etc.

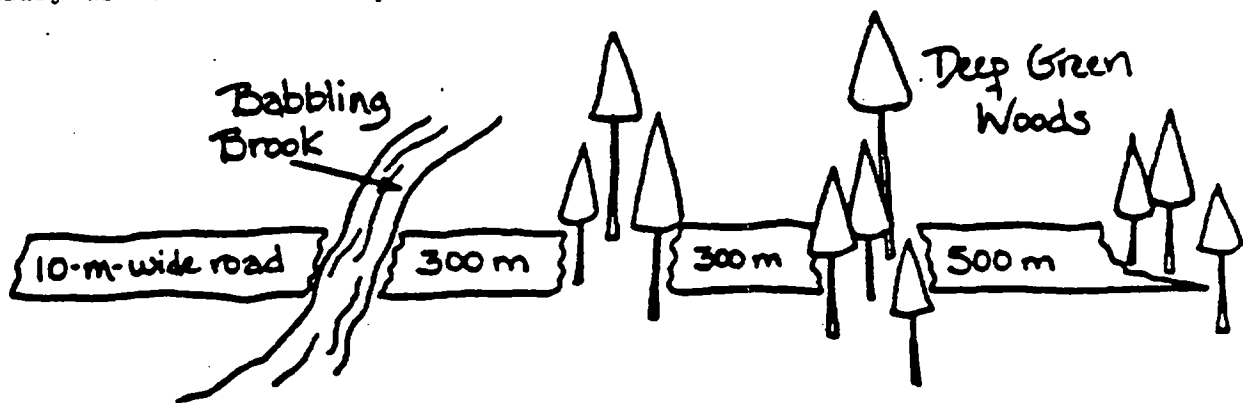
When measuring the width of constructed roads, railroads, powerlines, etc., include cutbanks and all areas that are kept free of tree size vegetation. Include brushed out, cut, or sprayed areas along right-of-ways when they appear different from the adjacent forest land.

When measuring stream width, include the area where the action of water prevents growth of trees to merchantable size. Classify stream margins, sand bars, and islands as nonforest if periodic high water prevents trees from attaining a height of 4 meters.

All forks of cultural nonforest stringers and nonforest streams are nonforest regardless of length. A fork of a constructed road connected to other nonforest area is nonforest regardless of length. Example:



If use of a constructed road, railroad, powerline, etc. is blocked by forest vegetation, the area on either side of the block must be 0.4 hectare in size to qualify as nonforest. Example:



The 10-meter-wide constructed road has not been maintained for 15 years. It is driveable to the point where Babbling Brook has washed out the culvert. Three hundred meters beyond the washout the Deep Green Woods hath reclaimed the road; 10-meter-tall Douglas-fir block the road at intervals. The road is nonforest up to the first patch of trees. It is then forest except for the 500 meter nontree stretch, which is nonforest.

2. Identifying boundaries between land classes.

a.) Indefinite forest boundary.

In areas where trees or tree indicators are present, there may be no distinct boundary between forest and nonforest. Decide if the pinpricked field grid location is more like forest or nonforest. If it is more like forest, remeasure or establish a forest plot locating all points on land which is more like forest. Comment in "present condition-past disturbance" why the plot was--or wasn't--installed or remeasured.

Refer to page 30 for definitions of forest and nonforest land.

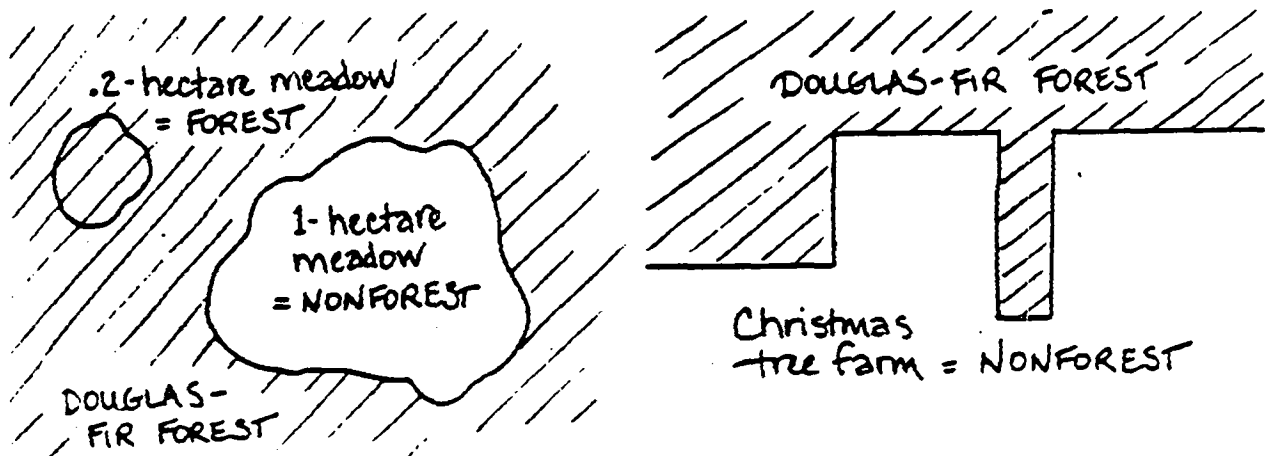
b.) Distinct Forest Boundary.

Distinct forest boundaries define the land class boundaries (see figure below).

A definite forest-nonforest boundary occurs where there is an abrupt change from forest land to land developed for nonforest use. The change is often delineated by a distinct change from forest vegetation to vegetation associated with nonforest use. Definite boundaries are often defined by fences, roads, firelines, yards, hedges, or the edges of fields.

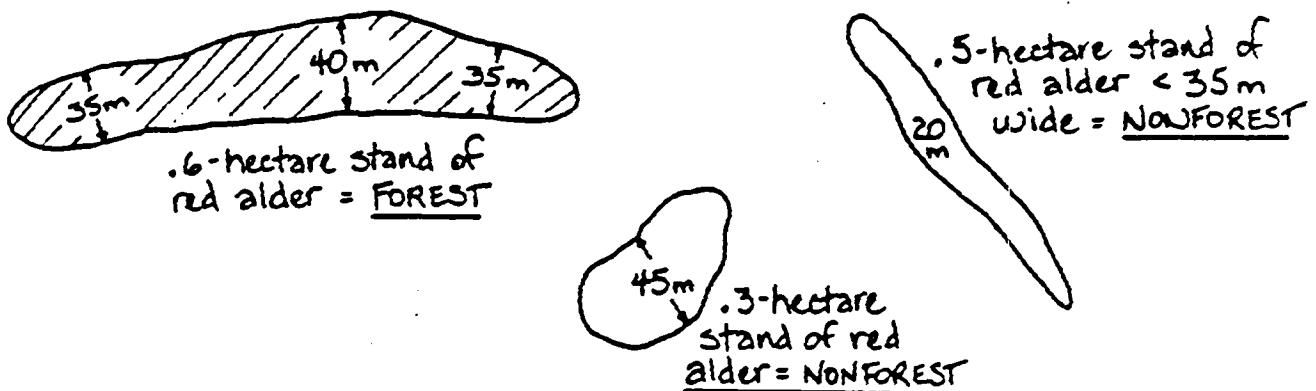
Forest vegetation includes trees, shrubs, and forbs of forest ecosystems. Areas with forest vegetation may still be called nonforest if used for nonforest purposes--for example: ferns in pastures or trees in golf courses.

Stringers of forest land extending into nonforest land and separated by a distinct boundary will be classed as forest only if they are at least 35 meters wide. The same is true of a nonforest stringer extending into forest land. Necks of forest land less than 35 meters wide but less than 35 meters long and connected to a tract that is at least 35 meters by 0.4 hectare in size will be classed as forest.



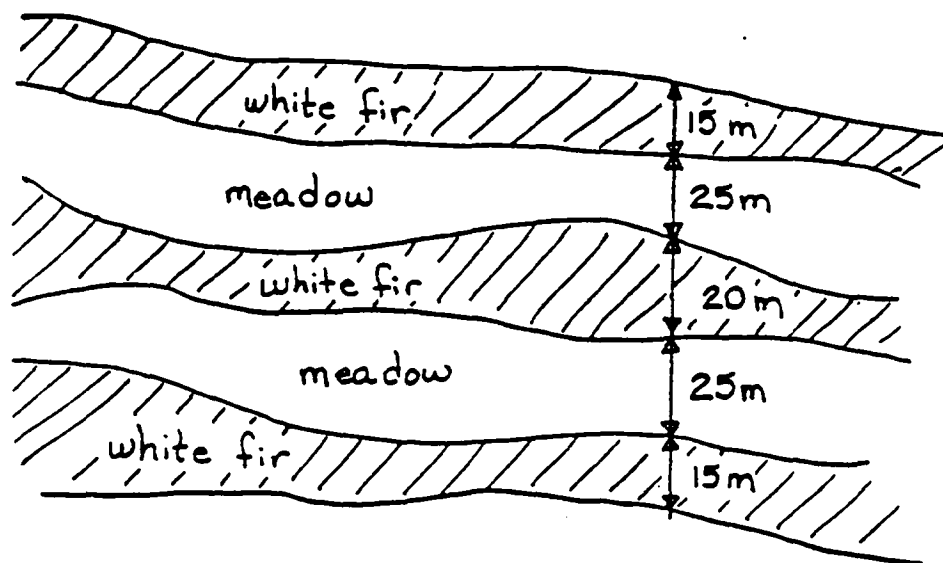
c.) Isolated vegetation or natural nonvegetated stringer.

Isolated stringers must be 35 meters wide and 0.4 hectare in size to be classed separately from surrounding land classes. There must be a contiguous area 0.4 hectare in size that is 35 meters wide (see figure below). Isolated forest stringers include areas surrounded by urban nonforest land.



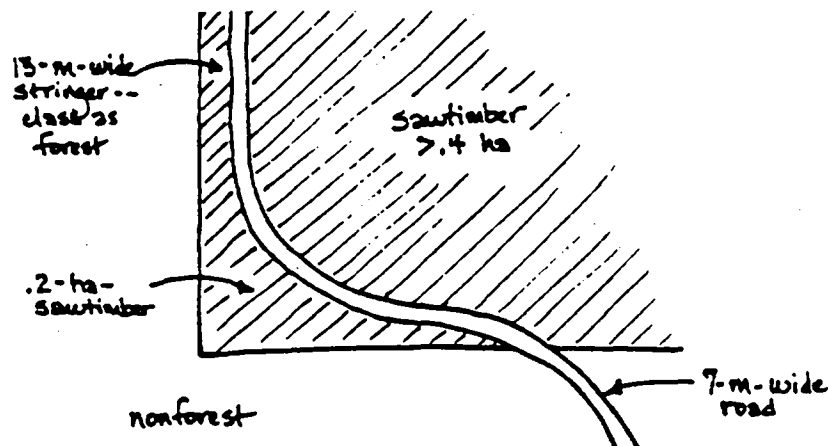
d.) Intermingled vegetation or natural nonvegetated stringers.

When a plot is located in intermingled natural stringers, each less than 35 meters wide, establish a forest plot, locating points as they fall. The plot tally will determine if the plot is forest or nonforest. If the plot is forest, the nonforest stringers are considered nonstockable areas.



e.) Land class amputation by cultural nonforest stringers.

When a cultural nonforest stringer isolates a stringer of forest that is less than 35 meters wide from adjoining forest, class the isolated forest strip as forest if the adjoining forest on the other side of the stringer is 35+ meters wide and 0.4 hectare or larger. If the cultural nonforest stringer is 35+ meters, class the isolated strip as nonforest (see figure below). A forest plot may straddle more than one owner class (excluding owners in nonsampled area) if needed to reach the 0.4 hectare minimum of forest land.



3. Ground land class definitions and codes.

LAND CLASS DEFINITIONS

Nonforest (code 61-69 92) - Land not qualifying as forest land. Includes land that has never supported forest growth, and land once forest land but now developed for nonforest use such as crops, pasture, residential areas, highways, airstrips, etc. Areas of water 0.4 hectares to less than 16 hectares in size or 10 meters to less than 200 meters in width will also be classified as nonforest. Census water, areas of water larger than these, is excluded from the gross area of the inventory unit. Christmas tree farms are classed as nonforest. (Nonforest codes are listed on page 25).

Forest Land - Land that is, or has been, at least 10-percent stocked by trees, and is not developed for nonforest use. 10-percent stocking is equated with 10-percent crown cover or 10-percent or normal yield table values.

Land may be developed for nonforest use even though tree cover is present. Indications of nonforest use may include the presence of fences or structures, the clearing of stumps, heavy grazing, the absence of forest vegetation, evidence of human habitation and use around maintained structures such as landscaping, gardens, lawns, and play areas. The absence of forest vegetation means that some or all layers of the vegetation present--trees, shrubs and forbs--differ from what one would expect on forest land undisturbed by nonforest use; for example, a fenced, farm-lot may have forest trees present, but the shrub and forb communities are altered by grazing. In Eastern Washington, grazing is common on forest lands and is not ordinarily reason to classify a plot as "developed for nonforest use".

Land that is or was formerly at least 10-percent stocked with trees on which urban development is imminent is still forest land; for example, if a plot location falls in a forested tract of several undeveloped lots in a subdivision and the tract meets minimum area, width and length requirements, the plot is forest land.

A tree is defined as a woody plant that has an erect perennial stem or trunk at maturity that is at least 7.5 cm in diameter at breast height (1.37 meters) and a total height of at least 4 meters. (Ag. Handbook No. 541, 1979, ed., p. 3).

Timberland (codes 20) - Forest land which is potentially capable of producing at least 1.4 cubic meters/hectares/year (20 cubic feet/acre/year) of continuous crops of trees to industrial roundwood size and quality and which is not withdrawn from timber utilization. Industrial roundwood requires species that grow to size and quality adequate to produce lumber and other manufactured products (exclude fenceposts and fuelwood which are not considered manufactured). Timberland is characterized by no severe limitations on artificial or natural restocking with species capable of producing industrial roundwood.

Other Forest Land - Forest land incapable of potentially producing at least 1.4 cubic meters/hectare/year in continuous crops of industrial roundwood because of species and/or adverse site conditions such as sterile soils, moisture stress, poor drainage, harsh environments, or rockiness. In Eastern Washington, plots with Oregon white oak as the predominate forest cover are always other forest.

Rocky (code 41) - Other forest land which can produce tree species of industrial roundwood size and quality, but which is unmanageable because the site is steep, hazardous, and rocky, or is predominantly nonstockable rock or bedrock, with trees growing in cracks and pockets. Other forest-rocky sites may be incapable of growing continuous crops due to inability to obtain adequate regeneration success.

Oak-madrone (code 44) - Other forest land with low quality forest trees of oak, madrone, or other hardwood species predominating. These sites are not, and show no evidence of ever having been, 10-percent or more stocked with trees of industrial roundwood size and quality. Trees on these sites are usually short, slow growing, gnarled, poorly formed, and are generally suitable only for fuelwood.

Unsuitable site (code 46) - Other forest land which is unsuitable for growing industrial wood because of one of the following environmental factors: willow bogs, spruce bogs, sites with high water tables, and harsh sites due to climatic conditions. Harsh climatic sites are commonly found along ocean shores and at timberline.

Low productivity (code 49)--Forest land capable of growing crops of trees to industrial roundwood quality, but not able to grow wood at the rate of 1.4 cubic meters/hectare/year. Included are areas of low stocking potential and/or very low site index.

Plots with an OCC2 GLC=41 or 49 were assigned this code during office review following the 1980 inventory. In the current inventory, new timberland plots will be reviewed for reclassification to other forest, rocky or low productivity. Review will occur in the office following fieldwork. Field personnel should indicate--via "Contact office about" and comments in "Present Condition; Past Condition"--that a new timberland plot may need reclassification to an "other forest" classification.

IV. PLOT REFERENCING AND LAYOUT

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IV. PLOT REFERENCING AND LAYOUT

A. Referencing the plot. Reference all plots measured on the ground (sample kinds 2, 4, 7, 8). If possible, reference plots that changed from forest to nonforest since OCC2 (sample kind 9).

The reference point (RP), point-of-departure (POD), and location description:
For every plot measured on the ground, an RP must be selected, and the section on the plot attribute record labeled "location description" must be completed. You may also select and label a point-of-departure (POD) if you feel it would aid in relocating the plot.

1. The reference point (RP). The RP is an object--usually a tree--that can be located on the ground and identified on the photo, and that will be useful for plot relocation at next inventory.

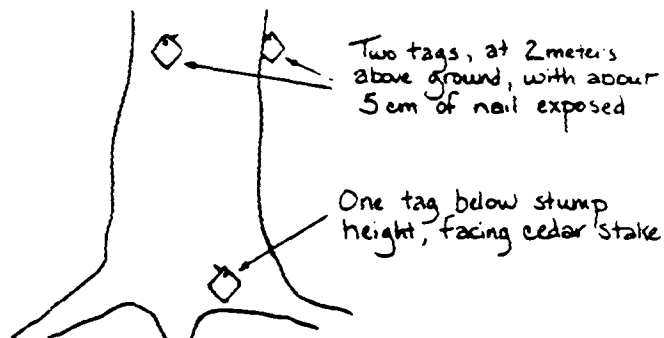
a.) Select an RP: The RP should be distinctive on both the ground and on the OCC3 photos. On remeasurement plots, you may reuse the OCC2 RP tree if it is suitable. If the old RP tree is dead and rotten, missing, or difficult to identify on the ground or on the plot photo, select a new RP. If possible, it should be a tree which is not likely to die or be cut before the next inventory. You may select a sound snag or other object for an RP (e.g., a distinctive fence post, building corner, telephone pole, etc.). If you use such an object, describe its location on the plot attribute record.

b.) Tag the RP tree: Mark the RP tree with new or reused tags (see figure below). Nail aluminum plot tags on two or more sides of the RP tree, 2 meters above ground line, facing directions you expect future crews to approach the RP. Also nail an aluminum plot tag on the RP tree below stump height, on the side of the tree facing point 1. When attaching the tags, drive nails into the tree at an upward angle and always leave at least 5 centimeters of nail exposed.

c.) Pinprick the RP location: Pinprick the RP on the OCC3 photos UNLESS the RP pinprick would be less than 2 mm from the pinpricked field grid location.

The field grid location is the pinpricked point center on which the ground land class and photointerpreted classifications (land class, ownership, development zone, stand height and density) are based. The field grid location coincides with the pinpricked OCC2 location of point 1 on plots measured at OCC2; this location will coincide with the pinpricked OCC3 location of point 1 even if point 1 requires substitution.

Using a pencil on the back of the photo, circle the RP pinprick. Write "RP", the plot number, species and dbh of the RP tree, and azimuth and distance to the plot near the circle (do not obscure the pinprick).



d.) Record the RP tree data: Record the species, dbh (to the nearest centimeter), azimuth, and slope distance (to the nearest meter from RP to the pinpricked field grid location (point 1 at OCC2 on plots measured at OCC2) under "plot reference" on the plot attribute record.

2. The point-of-departure (POD) (optional). On one of the OCC3 photos, pinprick your point-of-departure (POD). This is the place where you leave the established road and begin traveling cross-country. Circle the pinprick in pencil on the back of the photo and mark the circle "POD" on the photo back. Near the circle and on the plot card, record the azimuth and distance from the POD to the field grid location. Select a POD and route of travel that will facilitate relocating the plot. For this reason, it may be better to select the POD after the plot has been located and you are familiar with the area.

3. Record a description of the location: In the "location description" section on the plot attribute record, describe any information that would help the next crew find the plot.

Note how you reached the plot. Explain your route in terms of azimuth traveled; whether you walked uphill, downhill, or on the contour; any recognizable physiographical features (e.g. streams, rock outcrops, benches) you passed along the way. If any new roads have been built in the plot area since the date of the OCC3 photos, sketch them on the photos if it will help the OCC4 field crew to relocate the plot.

Describe prominent details concerning the plot area that are unlikely to change before the next remeasurement; examples include such items as slope, aspect, topographic position, man-made features, and unusual or large trees

B. Verifying and referencing the field grid location. The field grid location is the pinpricked point center on which the ground land class and photointerpreted classifications (land class, ownership, development zone, stand height and density) are based. The field grid location coincides with the pinpricked OCC2 location of point 1 on plots measured at OCC2; this location will coincide with the pinpricked OCC3 location of point 1 even if point 1 requires substitution.

The field grid location for sample kinds 2, 4, 7 and 8 is established on the ground with a cedar stake. The cedar stake is referenced to nearby trees so that the field grid location can be found at next inventory.

1. Verifying the field grid location: The field grid location is pinpricked in the office prior to the field season. When you arrive at the field grid location, compare the location to the pinprick on the OCC 3 photos. If the pinprick is close to the actual ground location, in the same type, and can be used to find the plot at OCC4, mark "Y" for the question "PINPRICK CORRECT?" under Interactive Items on the plot attribute record. If the pinprick is not in the same type as the field grid location, or the pinprick is greater than 2 mm photo distance from the correct ground location, or will not be usable for finding the plot again, pinprick the correct location, circle "N" to answer "PINPRICK CORRECT?", and put your initials after "Corrected by:".

If the original (office) pinprick is possibly in a different type or land class than the corrected pinprick, circle "Y" for the question "NEEDS RE-P.I.?". If the corrected pinprick is in the same type as the original pinprick, circle "N" to answer "NEEDS RE-P.I.?". See "Pinprick Correct?" on page 54.

Mark the field grid location (point 1 at OCC2 on plots measured at OCC2) on the back of the photos. Use a pencil to circle the pinprick and write PC (for "plot center") and the plot number near the circle. In addition, if the pinprick was corrected write "corrected location" and your initials.

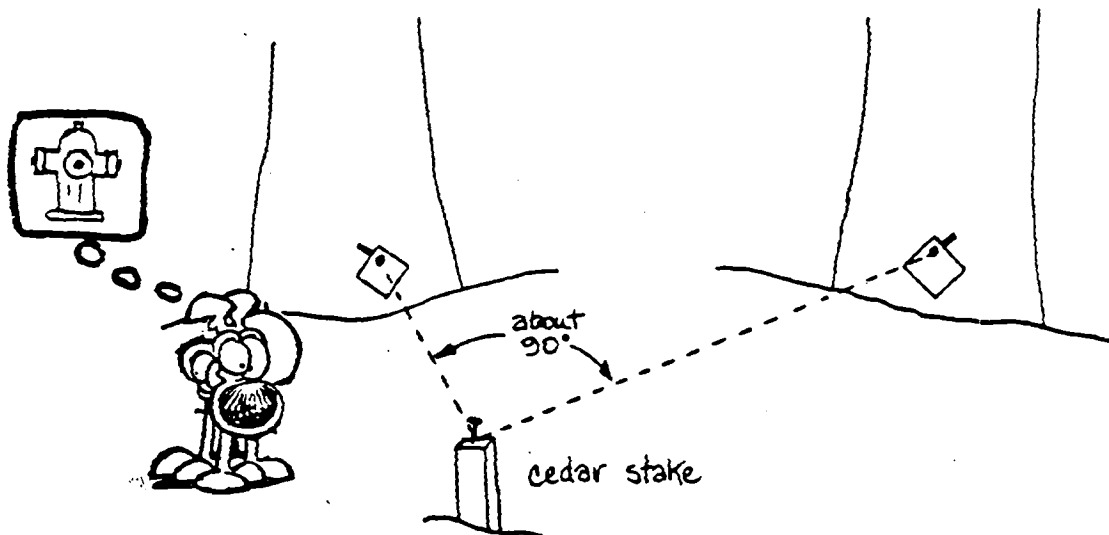
2. Referencing the field grid location: The field grid location is always referenced regardless of whether it is a point that requires substitution. Reference the field grid location by performing the following steps:

a.) Pound a cedar stake in the ground at the field grid location. On revisited plots (sample kinds 2 and 7, and remeasured 8), replace the old cedar stake.

b.) Select two trees near the stake that form, as close as available, a right angle with the stake and each other. If the OCC2 references for point 1 meet these criteria, they may be reused. Trees within 2 meters of the stake are preferable. If trees are not available, use stumps or sound snags.

c.) Nail a square aluminum tag below stump height (< 0.3 meter above the ground) on each reference tree on the sides facing the stake at point center. Leave at least 5 centimeters of the nail exposed. If the trees are also numbered tally trees, attach the tree number tags with the same nails.

d.) In two locations on each reference tree, nail a round disc at 2 meters above the ground facing the direction you expect future crews to approach the field grid location.



C. Referencing OCC3 points 1-5: Reference all N/R and N points on plots with sample kinds 2, 4, 7 or 8. An exception: if point 1 does not require substitution and therefore is located at the field grid (cedar stake) location, the point is adequately referenced by the procedures for referencing the field grid location.

Perform the following instructions:

1. Mark point center: Mark the point center with a metal pin and round.
2. Select reference trees: Select 2 trees near the pin that form, as close as available, a right angle with the metal pin and each other. Trees within 2 meters of the pin are preferred. If trees are not available, you may use stumps or sound snags. On N/R points, either use the previous references, or if there are now better ones available, use new references.
3. Tag reference trees: Nail an aluminum round to each reference tree, 2 meters above ground line, facing the direction you expect future crews to approach the point. The reference rounds for a point on the standard layout should face the field grid location regardless of the route that the crew travelled from point to point.

If the tree is not given a numbered tree tag at OCC3, nail an aluminum round below stump height, facing point center.

4. Record reference trees:

a.) Live or snag tally trees. If a reference tree is a live or snag tally tree (tree history=1,2,4,6 or 7), code "9" in the "remarks" column of the tree tally line in the Husky data recorder, or type "reference".

.b) Other tally trees and non-tally trees. If a reference tree is a non-tally tree or is a tally tree with a tree history of 3, 5, or 8, complete a line for the tree in the Husky data recorder, with the following required information:

- (1) Tree History = "9"
- (2) Species code (see page 87)
- (3) Diameter at breast height to the nearest centimeter
- (4) Azimuth to the nearest degree, from pin to tag
- (5) Distance--slope distance, to the nearest centimeter.

If a reference tree is a tally tree with a tree history of 3, 5 or 8, enter the reference information--items (1) through (5)--as a separate line.

D. Plot layout--general information:

1. Objectives: Points are laid out in order to meet several objectives:

- a.) sample a manageable resource area,
- b.) remeasure trees to provide information on change: growth, mortality, and cut,
- c.) assess the variability in stocking within one stand condition through use of a cluster of points (subplots),
- d.) improve inventory efficiency by minimizing the total number of sample points required in the cluster,
- e.) systematically sample within the same land class, owner class, and stand condition in order to produce reasonable plot averages.

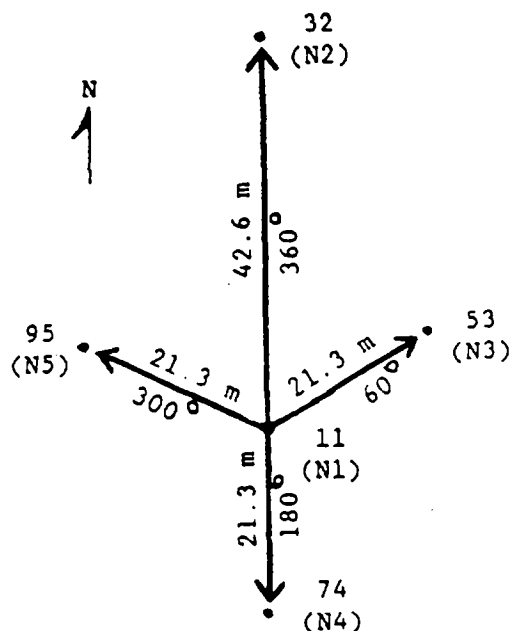
2. OCC3 plot layouts: The number of points that are laid out depends on sample kind, ground land use and, for some other forest plots, whether the plot area is steep and hazardous.

<u>Sample kind</u>	<u>OCC3 GLC</u>	<u>Plot Layout</u>
2	20,41,49	5-point remeasurement plot (fully remeasured at OCC2).
4	20,41,44,46,49	5-point lost or missing (reconst'd) plot.
4	20,41,44,46,49	5-point new, reconstructed plot.
7	20,41,49	5-point remeasurement plot (walked-thru at OCC2).
8	41,44,46: steep, hazardous)	1-point veg. profile plot.
9	60s, 92	nonforest--no plot laid out.
0	--	out of inventory--no plot laid out.

A plot that is steep and hazardous is characterized by permanent conditions that endanger crew members. If a plot appears to meet this definition, do a one-point veg profile plot (visually from a distance if the plot location can not be safely visited), comment in "present condition; past disturbance" about the steep and/or hazardous conditions and notify the crew supervisor. The crew supervisor will check that the steep/hazardous conditions are documented.

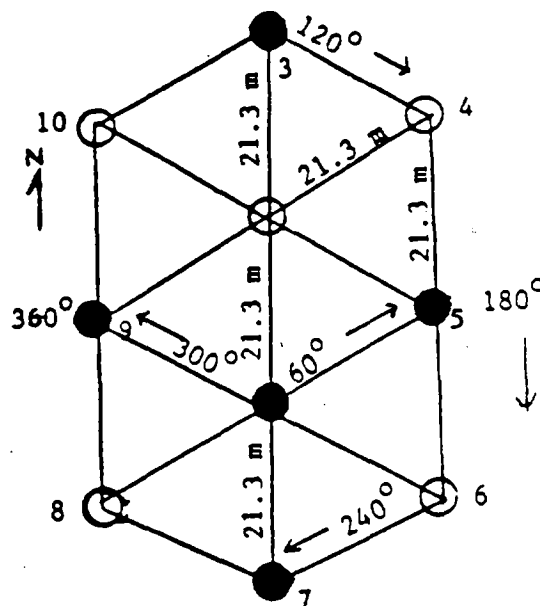
3. Standard 5-point layout: On remeasured plots (SK 2 and 7), lost or missing plots (SK 4) and new, reconstructed plots (SK 4), the standard 5-point layout documented in the 1980 Eastern Washington field manual applies in this inventory. When substituted points are required, the substitute points are selected using procedures that ultimately reference back to the standard layout.

**OCC3 STANDARD LAYOUT
IS BASED ON THE OCC2
STANDARD LAYOUT**



(POINT NUMBERING
ADOPTED AT OCC3)

**OCC2 STANDARD LAYOUT
WAS BASED ON THE OCC1
10-POINT PLOT**



(POINT NUMBERING
AT OCC2)

4. One-point vegetation profile plot (SK 8): On sample kind 8 plots, install or revisit a one-point plot. If the plot is new, establish point center at the pinpricked field grid location. If the plot was established at OCC2, adjust the pinpricked field grid location to match the location of the OCC2 cedar stake. Remeasured or new, substitute the point if the field grid location is within 10 meters of nonsampled area or a different land class; apply the substitution procedures on page 41.

E. The layout of remeasured plots (SK 2 and 7): Remeasurement plots are based on the 5-point layout measured at OCC2. In the current inventory, these points are remeasured unless obvious, distinct change has occurred since OCC2. Points are substituted to keep the layout an adequate distance within sampled area and an adequate distance within the same forest land class and broad stand condition--clearcut or not clearcut--as the field grid location.

Remeasurement plots are screened in the office for obvious, distinct changes since OCC2 that might require substituting points; check "Interactive Items" on the plot attribute record for plot layout instructions resulting from screening. Heed the instructions, but examine each OCC2 point for the following situations that the screener may not have detected:

1. The field grid location was not clearcut since OCC2, but other change has occurred: If a point measured at OCC2--including point 1--fails to meet the following two conditions, select a substitute point that satisfies the conditions:

see page 48 for
definition of clearcut
and partial cut

a.) The point center must be at least 10 meters within sampled area and must be at least 10 meters within the same forest land class and stand condition (not clearcut) as the field grid location.

b.) All snags and live, dead, culturally killed and harvested trees that qualify as tally at OCC3 must be within sampled area, and within the same forest land class and "non clearcut" stand condition as the field grid location.

Points are always substituted and never moved to satisfy these conditions. Substitute points are always new (N) points that require reconstructed tally.



2. The field grid location was clearcut since OCC2: If a point measured at OCC2--including point 1--fails to meet the following two conditions, select a substitute point that satisfies the conditions:

a.) The point center must be at least 10 meters within the clearcut and must be at least 10 meters within sampled area and the same forest land class as the field grid location.

b.) All snags and live, dead, culturally killed and harvested trees that qualify as tally at OCC3 must be within the clearcut and within sampled area and the same forest land class as the field grid location.

Points are always substituted and never moved to satisfy these conditions. Substitute points are always new (N) points that require reconstructed tally.

3. Lost points on remeasurement plots: If a point measured at OCC2 cannot be found, install a new (N) point at the location of the lost point indicated on the OCC2 plot card, provided that the appropriate set of conditions listed in E-1 or E-2 are satisfied. If the conditions are not met, substitute the point.

Regardless of OCC3 location, a substitute point is always an N point requiring reconstructed tally.

F. The layout of lost, missing and new plots (SK 4): The layout of lost, missing and new plots is based on the standard 5-point layout. However, all points including point 1 must fall in sampled area, and in the same forest land class, broad owner class and stand condition as the field grid location. Specifically:

1. Each point center must be at least 10 meters within sampled area and at least 10 meters within the same land class, broad owner group and stand condition as the field grid location, and

2. All snags and live, dead, culturally killed and harvested trees that qualify as tally at OCC3 at each point center must be within sampled area and within the same forest land class, owner class and stand condition present at the field grid location.

If a point on the standard layout fails to meet these two requirements, substitute the point until both conditions are met. Always substitute, rather than move a point to meet these conditions. All points on lost, missing and new plots require reconstructed tally.

Lost, missing and new plots are screened in the office for conditions affecting plot layout. Instructions are recorded in the Interactive Items on the plot attribute record for laying out the OCC3 plot. Follow these instructions unless you encounter a situation which the screener was clearly unaware.

G. Stand condition for lost, missing, and new plots (SK 4) and for new points on remeasured plots (SK 2 and 7) is defined by physioclass, broad forest type, size class, and stand density. Lost, missing or new plots should be placed entirely within a single stand condition. A stand condition must be at least 3.0 hectares in size to be recognized; combine areas most similar to the field grid location in stand condition until 3.0 hectares is achieved. Recognize stand condition boundaries that are distinct and obvious; ignore boundaries that are vague and indistinct.

Physioclass. Slope, aspect, and land form can affect forest type, stand density or treatment options. The following are examples of physioclass types that could be considered different stand conditions:

1. steep north slope vs. steep south slope.
2. swampy flat vs. well-drained side hill.
3. deep-soiled flat (plateau, bench, river bottom) vs. steep, thin-soiled side hill.

Broad forest type. Pure hardwood types, pure conifer types, mixed hardwood-conifer types, and brush are different stand conditions.

Size class. Areas of large trees (large pole or sawtimber), small trees (seed/sap), and nonstocked stands are different stand conditions.

Stand density. Areas of high density (75-100 percent crown closure), medium density (25-74 percent), and low density (0-25 percent crown closure).

H. How to substitute a point: Follow these steps when substituting a point:

1. Remeasurement plots (SK 2 and 7): Remeasure all OCC2 points that can be found and do not require substitution. Lost, missing or new plots (SK 4): Establish all points on the standard layout that do not require substitution.

2. Go to the established OCC3 point with the highest point number located in a standard position, and locate the substitute point from there. Use the following table to establish the substitute point at the first location that: (1) meets the conditions specified in E, F or G, (2) is at least 21.3 meters from all other points and (3) does not coincide with another point.

<u>Azimuth</u>	<u>Distance</u>
360	21.3 meters
60	21.3 meters
120	21.3 meters
180	21.3 meters
240	21.3 meters
300	21.3 meters

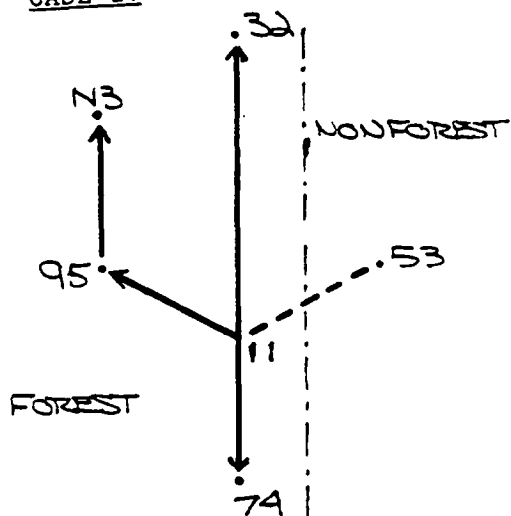
3. If more than one point needs to be substituted, substitute the point with the lowest point number first. Then follow steps "1" and "2" to locate the additional point(s).

4. If you can not locate substitute points from the highest numbered point in a standard position, go to the next highest numbered point in a standard position and repeat step "2".

5. If you have tried to locate substitute points off established standard points without success, go to the highest numbered substitute point and begin again. Continue the process until all 5 points have been established.

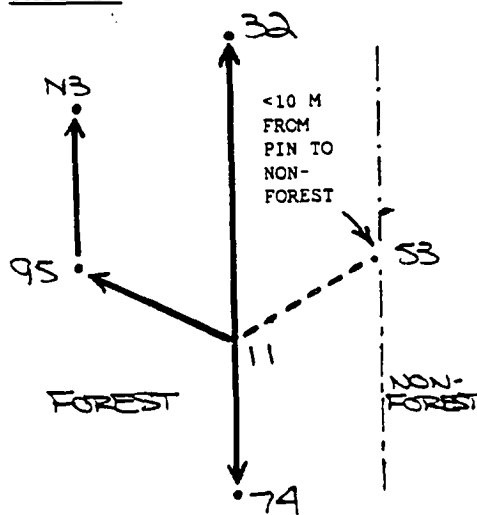
Examples of substituted points.

CASE 1:



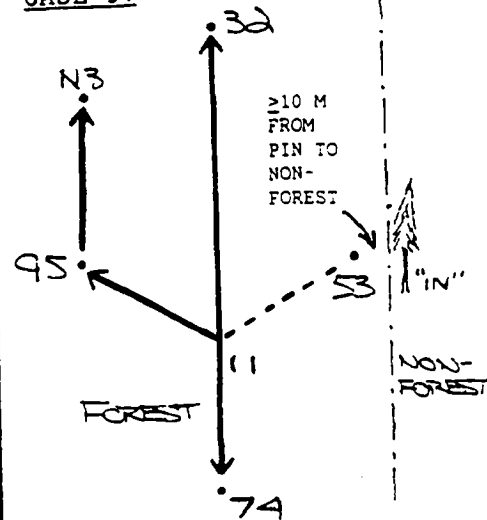
POINT 53 IS IN NONFOREST;
SUBSTITUTE TO POINT N3

CASE 2:



POINT 53 IS FOREST BUT
IS < 10 M FROM NONFOREST;
SUBSTITUTE TO N3

CASE 3:



POINT 53 IS FOREST AND ≥
10 M FROM NONFOREST. TREE
IN NONFOREST IS "IN" WITH
A PRISM. SUBSTITUTE TO N3

I. Point numbering:

During downloading, points visited at OCC2² are assigned the two-digit point numbers. The first character is the OCC2² point number (0-9); the second character is an assigned OCC3³ point number (0-5).³ The second (OCC3) number correlates in ascending order with the first (OCC2) number. On a remeasured plot (SK 2 or 7) with a standard layout at OCC2 and 3, the point numbers are 11, 32, 53, 74, and 95.

a.) N/R points are points on remeasured plots (SK=2 and 7, and remeasured SK=8) that were visited at OCC2 and qualify for remeasurement at OCC3. On an NR point, do not change the downloaded number.

b.) N points are points that are installed new at OCC3. An N point is recorded as a two-digit code: the first character is the letter "N"; the second character is the OCC3 point number (1-5). When a point is substituted or can not be found on a remeasured plot (SK 2 or 7), the second digit on the new point is the same as the assigned second digit of the point being replaced.

All points installed on lost, missing or new plots (SK 4) are N points. New one-point vegetation profile plots (SK 8) are N points (N1).

N points are installed on remeasurement plots (SK 2 and 7) when OCC2 points require substitution or can not be found.

Tree tally on all N points is reconstructed for OCC2 except on one-point vegetation profile plots.

VALID NUMBERS OF POINTS BY KIND OF POINT AND SAMPLE KIND EASTERN WASHINGTON

SAMPLE KIND	KIND OF POINT		
	N/R	N	N+N/R
2	0-5	0-5	5
4	0	5	5
7	0-5	0-5	5
8	1	1	1
9	0,1,5	0,1,5	0,1,5
0	0,1,5	0,1,5	0,1,5

V. PLOT AREA CLASSIFICATION

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V. PLOT AREA CLASSIFICATION

A. Plot area classification items. Plot area classification items are recorded on the plot attribute record. Refer to the guide below to determine which area classification items to complete.

REQUIRED FIELD CREW TALLY FOR THE PLOT ATTRIBUTE RECORD

<u>Sample Kind</u>	<u>OCC3 GLC</u>	<u>Data needed for these items:</u>
2,4,7 (remeasurement, new lost, missing)*	20,41,49	1-10*; 11-13, 15-28*
4 (new, lost or missing)*	44,46	1-10*; 11-13, 15-23, 25-28
8 (other forest)*	41,44,46	1-10*; 11-23, 25-28
9 (nonforest)*	60s,92	1-10*

* New plots (new-to-sample area) will not have item 6 (OCC2 date), item 8 (OCC2 GLC) and item 24 (OCC2 TOP) completed.

1. Item 11--Precipitation. 3-digit code printed on the plot attribute record that shows average annual precipitation in centimeters. Do not change the printed code.

2. Item 12--Elevation. 4-digit code printed on the plot attribute record that shows the plot's elevation to the nearest 50 meters. Do not change the printed code. The plot's elevation is determined by direct inspection of the USGS quadrangle maps. Information on elevation is useful for describing a plot's potential productivity and potential use as wildlife habitat.

3. Item 13--Plant Association. 6-character code describing the predominant plant association on the site. On plots done in 1991, do not change or add this variable. On plots done during the 1990 field test, update the plant association code to show all six characters recorded on the occasion 2 plot card; this applies to forest plots in Asotin, Columbia, Garfield and Walla Walla Counties, but does not include Whitman and Klickitat County plots.

4. Item 14--Stand condition. Code only for plots with a sample kind 8 and a ground land use code of 41, 44, or 46. Record a 1-digit code, for one-point, other forest plots that best describes the condition of the stand within the 10-meter fixed-radius plot. For plots with sample kinds 2, 4, and 7, stand condition is calculated using tree tally data. Stages of development are the result of natural growth and development of plant communities following disturbance. Information on size class is used describing wildlife habitats. The codes are defined as follows:

<u>Code</u>	<u>Stand condition</u>	<u>Description</u>
1	grass-forb	Shrubs less than 40-percent crown cover and less than 1.5 m tall; plot may range from being largely devoid of vegetation to dominance by herbaceous species (grasses and forbs); tree regeneration generally less than 1.5 m tall and 40-percent cover.
2	shrub	Shrubs \geq 40-percent crown canopy of any height; trees less than 40-percent crown canopy and less than 2.5 cm dbh. When average stand diameter exceeds 2.5 cm dbh, plot is "open sapling" or "closed sapling".
3	open sapling-pole	Average stand diameter 2.5-22.9 cm, and tree crown canopy less than 60-percent.
4	closed sapling, pole, sawtimber	Average stand diameter is 2.5-53.3 cm, and crown cover is 60-percent or greater.
5	open sawtimber	Average stand diameter is 23.0-53.3 cm; and crown cover is less than 60-percent.
6	large sawtimber	Average stand diameter exceeds 53.3 cm; crown cover may be less than 100-percent; decay and decadance required for old-growth characteristics is generally lacking, successional trees required by old-growth may be lacking, and dead and down material required by old-growth is lacking.
7	old-growth	Average stand diameter exceeds 53.3 cm. Stands over 200 years old with at least two tree layers (overstory and understory), decay in living trees, snags, and down woody material. Some of the overstory layer may be composed of long-lived successional species (e.g. D.-fir, W. redcedar).

5. Item 15--Plot aspect. 2-digit code. Refer to the aspects recorded for individual points to help determine the plot average. Use the same coding system. For timberland plots, code the aspect which would most affect timber management. Examples: the aspect is equally SE, S, SW: code the aspect S; the aspect is SE, S, SW but 80-percent of the area is SE: code the aspect SE.

6. Item 16--Plot slope. 2-digit code. Refer to the slope recorded for individual points to help determine the plot average. Use the same coding system. Examples: the slope changes gradually from 20 to 60-percent: average the individual point slope percents; the slope ranges from 20 to 60-percent but most of the plot area is on the steeper slope: code the steeper slope.

7. Item 17--Type of Logging. 1-digit code that describes the type of logging system most recently used to harvest or convert in the previous or present stand. This information is used to evaluate timber extraction costs.

<u>CODE</u>	<u>TYPE OF LOGGING SYSTEM</u>
1	Previous stand was clearcut using a cable system.
2	Previous stand was clearcut using crawler tractors, rubber-tiredskidders, or mobile feller-bunchers.
3	Previous stand was clearcut, but the type of logging system is unknown.
4	Partial, seed tree or shelterwood harvest has occurred in the present stand using a cable system.
5	Partial, seed tree or shelterwood harvest has occurred in the present stand using crawler tractors, rubber-tired skidders, or mobile feller-bunchers.
6	Partial, seed tree or shelterwood harvest has occurred in the present stand, but the type of logging system is unknown.
7	Stand has never been harvested or converted.

The discussion on clearcut, partial, seed tree and shelterwood harvest in the present stand is found in Item 19 on page 48.

8. Item 18--Soil depth. 1-digit code. Code this item "1" when three or more points (10-m fixed-radius plots) have soil less than 50 centimeters in depth.

<u>CODE</u>	<u>SOIL DEPTH</u>
1	Less than 50 cm
2	50 cm or greater

9. Item 19--Kind of harvest since OCC 2. Record a 1-digit code describing harvesting since the OCC2 inventory. Apply the following logic:

If the plot is sample kind 2: Code for harvest only if any tree tallied live at OCC2 with an OCC2 dbh ≥ 12.5 cm is coded as harvested (TH 8) between OCC2 and 3.

If the plot is sample kind 4: Code for harvest only if any tree tallied and reconstructed as live and ≥ 12.5 cm dbh at OCC2 is coded as harvested (TH 8) between OCC2 and 3.

If the plot is sample kind 7: Code for harvest only if any tree tallied live at OCC2 is coded as harvested (TH 8) and OCC2 diameter is estimated to be coded ≥ 12.5 cm dbh.

If the plot is sample kind 8: Code for harvest if evidence--stumps, slash etc--indicates that tree(s) live and ≥ 12.5 cm dbh at OCC2 were harvested within the 10-meter fixed-radius plot.

<u>CODE</u>	<u>KIND OF HARVEST</u>
0	No harvest
1	Clearcut harvest
2	Partial harvest
3	Seed tree or salvage removal
4	Firewood or local use harvest
5	Incidental harvest

If more than one kind of harvest occurred since OCC2, harvest activities for industrial supply (codes 1,2 and 3) take precedent over harvest activities for firewood, local use or incidental reasons (codes 4 and 5).

Definitions:

Clearcut harvest: Residual trees of all sizes comprise < 25 -percent cover and at least 20-percent of trees tallied live and ≥ 22.5 cm dbh at OCC2 were harvested. The residual trees usually include cull trees and less commercially desirable hardwoods.

Partial harvest: Live tally trees at OCC3 comprise ≥ 25 -percent cover after the harvest, and at least 20-percent of trees tallied live and ≥ 22.5 cm dbh at OCC2 were harvested. In a partial harvest the residual stand consists of commercially desirable trees. In initial and intermediate shelterwood cuts that qualify as a partial cut, the residual trees are conifers that were left to regenerate a new stand. Ordinarily, final seed tree removal will not qualify as a partial cut. This category does not include harvesting for firewood and for "local uses". Nor does it include the incidental harvest of trees where < 20 -percent of the stand was harvested.

Seed tree or salvage removal: Harvest of residual sawtimber trees in a regeneration stand, or in a sparsely stocked stand with < 25 -percent tree cover, or in a nonstocked area. Include final salvage cuts--removals of residual trees left after clearcut harvests.

Firewood or local use removal. The harvest of trees for firewood, or the harvest of trees for roundwood products manufactured and used locally by "do-it-yourselfers", often on the ownership of origin, for improvements such as fences, buildings and bridges.

Incidental removal. Any harvest activity that does that not qualify as another kind of harvest since OCC2. Includes the harvest of occasional trees in an otherwise undisturbed stand; and includes a harvest activity in an adjacent stand condition that results in the removal of one or more tally trees. If the adjacent harvest is a clearcut harvest that removed one or more trees tallied or reconstructed as live and ≥ 12.5 cm dbh at OCC2 on an N/R or N point, substitute the point, and do not code for this adjacent clearcut harvest.

This item aids users of FIA data to track the history of stand development. It is used in timber supply projections, and it provides information for harvest studies.

10. Item 20--Kind of harvest before OCC2 1-digit code, printed by the computer. It indicates the type of most recent harvesting activity recorded by the field crew in the previous inventory. Codes are defined in Item 19. Update the printed code if it is incorrect. For sample kinds 4 plots, record if cut before last inventory in 1980.

11. Item 21--Date of harvest since OCC2. If a 1,2,3,4, or 5 was coded in Item 19, record a 2-digit code for the year of the harvest activity that occurred since OCC 2. Example: a harvest in 1981 is coded 81. If a zero was recorded in Item 19, enter "00" for this item. For lost, missing and new plots (sample kind 4) estimate the age of cutting, and record if harvested since last inventory in 1980.

On plots with harvest since OCC2, rely on the best available information in determining the date of harvest. When visiting a plot on which harvesting has occurred, the freshness of stumps, slash and degree of revegetation are indicators of date of harvest. In clearcuts, the age of the regeneration stand may provide a "yardstick" to date the harvest, but remember to account for the time elapsed between harvest and planting. In partial cuts, one can estimate date of harvest by boring residual trees in order to count the number of rings since release; this technique may also be applied to clearcuts by boring trees located in adjacent stands that are on the clearcut boundary. When dating by boring, consider whether to add an extra year (or years) as release often is not evident in the first year following harvest.

For SK 2, 4, and 7: When feasible, Confirm the date of harvest. This may be done in a variety of ways. Prior to visiting a plot, the field supervisor or crew can "prescreen" the photos for harvest activity and, if signs or harvest are present, inquire of the owner during a contact to gain access; or check with the owner or a near-by neighbor after leaving a cut plot. A general rule of thumb: apply your ingenuity in confirming the date of harvest, but do so in a manner that incurs little or no cost. If confirmation requires more than 15 minutes for a plot, the cost is likely excessive; however, as a minimum, make an estimate for date of harvest based on field observations made on the plot. If the date is confirmed, enter a "Y" (yes) for "Harvest confirmed?" on the plot attribute record in interactive items.

12. Item 22--Date of harvest before OCC2. 2-digit code, printed by the computer. It indicates the year of most recent harvesting, as determined by the field crew in the OCC2 inventory. Update the printed code if it can be determined that the previous crew miscoded the item or if "??" is printed on the plot attribute record. On sample kind 4 plots, estimate age of cutting and record here if before inventory in 1980. Acceptable codes are 02 - 80. Code "01" for cutting in the 19th century. Code "00" if no harvest occurred prior to OCC2.

13. Item 23--Silvicultural treatment since OCC2. Record a 2-digit code that describes silvicultural treatments occurring since the OCC2 inventory. Code only for activities that have occurred within 10 meters of N or N/R point centers or that have affected trees tallied or reconstructed as live at OCC2. Use combinations of codes to record multiple treatments. For example: "24" or "42" indicate site preparation and planting of poorly stocked "holes".

<u>CODE</u>	<u>KIND OF CULTURAL ACTIVITY</u>
00	No treatment
01	Planting
02	Plant holes
03	Precommercial thin
04	Site preparation
05	Clean and release
06	Underplant
07	Improvement cut
08	Stand conversion

Definitions of silvicultural treatments:

Planting. Planting the area to establish a manageable stand.

Plant holes. Planting of nonstocked openings to fill-in or create a manageable stand.

Precommercial thin. An intermediate harvest in which excess growing stock are killed but not sold.

Site preparation. Preparation of the site for the establishment of a new, manageable stand. The treatment reduces or eliminates hardwoods, brush, ferns, slash, and other inhibiting materials. Soil may be furrowed.

Clean and release. Killing or suppression of undesirable, competing vegetation--usually brush or hardwoods--from a manageable stand. A herbicide treatment in young, regenerated stands is one method of clean and release.

Underplant. Planting under a sawtimber overstory.

Improvement cut. Cutting of commercial-sized, unsalable trees to free crop trees from competition. Improvement cutting differs from a commercial thinning in that the trees cut are not marketable.

Stand conversion. The killing of low-value or unmarketable trees--often hardwoods--and planting of the area to establish a manageable stand. Most commonly, low-value hardwood stands are converted to conifer stands.

14. Item 24--Treatment Opportunity at OCC2. 4-digit code, printed by the computer. Do not change the printed code. This item indicates the opportunity for silvicultural treatment identified at OCC2. This information is printed for office use. Codes and definitions follow.

<u>First digit</u>	<u>Management type</u>
1	Conifer
2	High-value hardwood
3	Mixed: conifer and high-value hardwood
4	Manageable stand absent

<u>Second digit</u>	<u>Stage of development</u>
1	Regeneration
2	Intermediate
3	Mature
4	Manageable stage absent

<u>3rd and 4th digits</u>	<u>Treatment Opportunity</u>
01	No treatment
02	Site preparation and plant stand
03	Site preparation and plant holes
04	Precommercial thin
05	Precommercial clumps
06	Clean and release
07	Commercial thin
08	Improvement cut
09	Sanitation salvage
10	Regeneration harvest
11	Shelterwood seed cut
12	Shelterwood removal cut
13	Recent shelterwood seed cut--no regeneration present
14	Underplant
15	Stand conversion
16	Recent clearcut
17	Recent clearcut--partial regeneration present
18	Plant
38	Improvement cut, site preparation and plant holes
48	Improvement cut and precommercial thin
58	Improvement cut and precommercial thin clumps
68	Improvement cut, and clean and release
78	Improvement cut and underplant
99	Marginal site

15. Item 25--Hardwood site. 1-digit code printed by the computer. Do not change the printed code. If the code is questionable, note so under "Contact Office About" on the plot attribute record and alert the crew supervisor. A plot with a code of "1" for hardwood site must also be coded with a hardwood plant association code.

<u>Code</u>	<u>Condition</u>
1	Plot is timberland that is a hardwood site incapable of growing a manageable conifer stand. Example: cottonwood flats along streams.
0	Plot is any other condition.

Plots on hardwood sites are handled differently in timber supply projections, and in classification of opportunities for silvicultural treatments. Because this item indicates the potential vegetation of an area, it is useful for classifying wildlife habitat and for studying hardwood resources.

16. Item 26--Grazing. Record a 1-digit code indicating the occurrence and impact of grazing.

<u>Code</u>	<u>Grazing description</u>
0	No signs of grazing since OCC2 within the stand.
1	Signs of grazing since OCC2 present, but grazing does not have a significant impact on the stand.
2	Grazing since OCC2 is significantly impacting the stand.

The stand is significantly impacted when grazing activity by domestic livestock prevents tree regeneration on three or more of the 10-meter fixed-radius plots. Look for soil compaction, severely browsed seedlings, and trampled seedlings.

17. Item 27--# N/R points. Record a 1-digit code (0-5) indicating the number of points remeasured at OCC3.

18. Item 28--# N points. Record a 1-digit code (0-5) indicating the number of new sample points measured at OCC3.

19. Item 29--Weighted discount factor. This item is downloaded in the office prior to fieldwork. Do not change the factor.

20. Item 30--Stockable factor. This item is completed in the office after fieldwork. Leave blank.

B. Interactive Items.

1. Crew identification: Estimator--Recorder--Date. Record each crew member's name, and the date the plot was completed.

2. OCC3 Plot Layout. Diagram the locations and numbers of sample points; any significant features (e.g. drainages, rock outcrops, other items that may help future crews relocate the plot); any stand conditions or land classes that affected plot layout (i.e. diagram substituted points). Label north direction. The plot layout diagram aids future crews in locating points measured at OCC3, and FIA staff use the diagram to analyze plot conditions.

3. Present condition/Past disturbance. Provide general information about the plot area, such as: stand age, species composition, stand history (cutting and other disturbances such as fire, flooding, wind, mining, grazing, home-building, recreational development), stocking, understory, recommended treatments. Note anything unique or unusual about the area. In addition, discuss any questions regarding land class, site index questions, explanations for number of site trees taken, plot layout, disease or other impacts, harvest, silvicultural treatment (if the treatment occurs on less than all five points, note the point numbers, and describe the types). In discussing any changes in how the plot area is classified (e.g. changes in land class, stand history, stand impacts, etc., that are due to a road, management activity, etc.), note whether the change is a real change since OCC2, or a pre-existing condition that was misclassified at OCC1 or OCC2. Also indicate the item in "Contact Office About".

While some of this information is coded elsewhere on the data sheets, this narrative provides valuable additional information that can enable an analyst to better understand the area.

Please limit your comments to professional, dispassionate technical descriptions and details. Comments that are opinionated editorials concerning the site, its management, or its owner are unacceptable. The plot comments are public records; the general public including plot landowners may read the comments.



4. Field Check Item: This is an office-entered item to alert the field crew for any classification questions, information needs, or any specific requirements for collecting information from the plot.

5. Owner Response: This is an office-entered item to inform the field crew of the status of landowner contact for the plot. All miscellaneous private owners were sent an informative letter of intent before the field season. If the landowner has responded to the letter by returning the post card with a name, address, and/or phone number of whom to contact before going onto the property, "(YES) card enclosed" will be circled. If it is unknown whether contact has been established, "(NO) need to check owner list" will be circled.

Forest industry and corporate owners are contacted by telephone before the field season. A list of responses is compiled indicating the name and phone number of the person, if any, to contact when ready to visit the plot. Any known special conditions concerning plot access will be written on the plot jacket or under Interactive Items by the crew supervisor.

6. Contact Office About: This is a field-entered item. The crew should note any items that they believe need to be reviewed or resolved by the crew supervisor or by office personnel before the plot is processed. Any changes to ground land class or owner class and any situation that would require the revision of photointerpreted classifications must be noted in "Contact Office About".

7. Is the date of harvest since OCC2 confirmed? This a field-entered item that indicates whether the date of harvest is confirmed. If harvest has occurred since OCC2 and the date of harvest is confirmed, enter "Y" (yes). If no harvest has occurred since OCC2 or the date of harvest is unconfirmed, enter "N" (no). See page 49 for details on confirming the date of harvest.

8. Does owner class differ from current owner? This is a field-entered item that is used in updating owner class on the data file. Circle "YES" if there is clear evidence (i.e. surveyed boundary markers, conversation with the owner, or courthouse records that indicates the plot falls in an ownership that is different from the downloaded/printed class. Note the source of information and the updated owner class in the space provided. Also, update the owner list (provided by crew supervisor).

9. Does the plot direction differ from the PI direction? If you laid the plot out in a general direction that is other than the PI direction, answer "YES." If yes, explain why the plot was laid out on the ground in the direction chosen.

10. Pinprick Correct? Transferring pinprick locations in the office from old to new photos is sometimes difficult. We occasionally find plots with pinprick locations that are inconsistent between inventories. Occasionally on revisited plots, the OCC3 pinprick differs from the true ground location of the field grid location. Regardless of how you record this item, make sure the pinprick location on the OCC3 photos is true to the ground location of the field grid location.

a.) Pinprick correct? Circle "Y" or "N," to indicate whether the OCC1 and OCC2 pinprick location agrees with the field grid location on the ground and with the OCC3 pinprick.



Code	Description
------	-------------

Y	OCC1, OCC2 and OCC3 pinpricks agree with the field grid location.
N	OCC1, OCC2 and OCC3 pinpricks do not agree with the field grid location.

b.) If no If you entered "N", change the incorrectly pinpricked locations on the OCC1, OCC2 or OCC3 plot photos to agree with the the field grid location. Initial and date the space provided to indicate you have done so, and note in "Contact Office About" which photos were re-pinpricked.

c.) Does point need re-p.i.? If the field grid location pinpricked in the office on the OCC3 photos is not correct, the crew must determine whether the corrected pinpricked location (corrected by the crew in the field) is in a different stand condition than the "office" pinprick. If different, note how the two conditions differ in "Contact Office About" on the plot attribute record. See page 38 for a definition of stand condition.

<u>Code</u>	<u>Description</u>
-------------	--------------------

Y	The field-corrected pinpricked location is <u>not</u> in the same stand condition as the office-pinpricked location on the OCC3 photos. (Re-pi is not needed).
---	--

N	The field-corrected pinpricked location is in the same stand condition on the OCC3 photos. (Re-pi is needed).
---	---

11. OCC2 GLC updated? This is a field-entered item that is used in updating OCC2 ground land use on the plot file. Circle "NO" if you disagree with the OCC2 GLC classification and note the reason.

12. Site Index Data: This is an office (computer-printed) and field-entered item. Site information collected at previous occasions are reviewed in the office prior to fieldwork. Valid site trees from previous inventories are printed on the plot attribute card. Instructions by the reviewer to the crew for collecting site data will be noted in "Field Check Item". The crew will enter the information on a separate line in the Husky when instructed to collect site trees. The crew may have to drop site trees when a large difference in indices is present; if deletion is needed, it will be noted in "Field Check Item".

C. Plot Site Index--Site trees.

1. Objective. Information on site index is used to evaluate the quality of a site for growing trees.

2. Tree selection. Select and measure new site trees only if instructed to do so on the plot attribute record. New site tree data is requested when the site index information from OCC2 is incomplete, absent, or unreliable. If you cannot obtain the requested minimum number of site trees, get as many as possible. Make a note to that effect in "present condition/past disturbance" on the plot attribute record.

Additionally, remeasure the height on any site tree previously recorded that meets all of the following criteria: (1) recorded breast-height age is ≤ 60 years, and (2) the tree can be relocated without any doubts that it is the same tree measured previously. If a qualifying tree was tallied at OCC1 or OCC2 on a point, its last recorded point number and tree number is handwritten on the OCC3 plot attribute card to aid in relocation.

3. Rules for selecting site trees.

- a.) If the plot is a conifer site (Item 25 on the plot attribute record is coded "0" and plant association is a conifer type) select only conifer trees. If the plot is a hardwood site (Item 25 is coded "1"), aspen, red alder or black cottonwood site trees may be used.
- b.) Douglas-fir and ponderosa pine are the preferred species in mixed conifer stands in eastern Washington. In lodgepole pine stands, lodgepole site trees are preferred. If possible, use a species that is predominant in stocking or size in the plot area.
- c.) Site trees on a plot should be of the same species. You can combine grand fir with Douglas-fir, and noble fir with mountain hemlock.
- d.) Do not use trees that have been suppressed. Be particularly careful when in residual stands from which the dominant trees have been harvested. If it is necessary to use true fir site trees, be sure that they are not released understory trees. Avoid Pacific silver fir if possible due to the likelihood of suppression.
- e.) Select dominant trees.
- f.) Trees less than 50 years old are undesirable if older trees are available. For ponderosa pine, trees 60 to 120 years old are most desirable, but it may be necessary to select younger trees.
- g.) Site trees should be representative of the plot area.
- h.) Select trees that show no signs of top-out, such as crooks or forks, UNLESS these trees are taller than normally-formed trees of the same dbh.
- i.) If no suitable site trees are available from the plot area, select dominant trees from a nearby area with the same general aspect and elevation. Note in "Present condition/Past disturbance" that the site trees are not current tally trees.
- j.) Site index should not vary by more than ²⁰~~20 or 30~~ between site trees unless the difference can be explained by actual site variation within the plot area.
- k.) Do not use whitebark pine for site trees.

1.) Valid site tree species in Eastern Washington are:

<u>Species code</u>	<u>Species</u>
011	Pacific silver fir (only as last resort)
017	grand fir
022	noble fir
073	Englemann spruce
093	western larch
108	lodgepole pine
119	western white pine
122	ponderosa pine
202	Douglas-fir
242	western red cedar (only as a last resort and only in a cedar stand)
263	western hemlock
264	mountain hemlock
351	red alder (only on a hardwood site)
346	quaking aspen (only on a aspen hardwood site)
747	black cottonwood (only on a hardwood site)

4. Data recording. For each site tree measured, record the following:

a.) Sequence number (#). 2-digit Husky generated identification number.

b.) Species (SPC). 3-digit code. Use the the species codes listed above.

c.) Dbh (DBH). 4-digit code. Record to the nearest 1/10 cm; may be estimated.

d.) Height (HT). 3-digit code; if you are selecting a new site tree, record its OCC3 height. If you are reentering a site tree recorded during a previous inventory, record the height measured previously. Height is recorded to the nearest decimeter.

e.) Remeasured height (RHT). 3-digit code; record to the nearest decimeter. Measure and record current height on site trees previously recorded if (1) less than 60 years BH Age at the time of measurement, and (2) if the tree can be positively identified as the tree previously measured.

e.) Breast-height age (BH AGE). 3-digit code indicating the tree's age at breast height. If you are reentering a site tree recorded during a previous inventory, record the age previously measured. Enter the breast-height age for new site trees.

f.) Inventory originally recorded (OCC REC). A one digit code indicating the inventory in which the tree was first recorded. ~~Record for~~ ^{Record for} all valid old and new site trees on a plot. Occasion 1 (1967-68) inventory is recorded "1", occasion 2 (1980) inventory is recorded "2", and occasion 3 (current inventory) is recorded "3". *Downloaded for all site trees recorded at OCC1 or 2. Automatically entered for by Husky for site trees entered new at OCC3.*

VI. POINT CLASSIFICATION

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VI. POINT CLASSIFICATION

A. Point classification. Tally all point attribute items on plots with a sample kind of 2, 4 or 7 and a ground land class of 20, 41, or 49. Tally all items except nonstockable area, hardwood site and root disease on plots with a sample kind of 4 and a ground land class of 44 or 46. Tally all items except nonstockable area, hardwood site and root disease on plots with a sample kind of 8. Do not tally any point attribute items for plots with a sample kind of 9

1. Point number. Record a two-character point number for each new (N) and remeasured (N/R) point with a sample kind of 2, 4, 7, or 8. The point number should be the same as the number used for tree, snag and vegetation profile tally. See 43 and 85 for further information.

2. Physioclasse information. Point-level information on slope and aspect describes a 10-meter fixed-radius plot around each sample point center. Slope and aspect are important variables for explaining variations in species composition of plant communities. Point-level information is also helpful in determining plot averages.

a.) Aspect. Record a 2-digit code for each new (N) and remeasured (N/R) point with a sample kind of 2, 4, 7, or 8. For plots with N, S, E, W, and F aspects; leave the second digit blank. If aspect is flat (F), record slope as "0".

<u>Code</u>	<u>Azimuth</u>
N-	338 - 22
NE	23 - 67
E-	68 - 112
SE	113 - 157
S-	158 - 202
SW	203 - 247
W-	248 - 292
NW	293 - 337
F-	Flat

b.) Slope. Record a 2-digit code indicating the percent slope of the 10-meter fixed-radius plot at each point. Record if aspect was required. You may record the exact slope or round to nearest 5-percent.

If greater than 99%, make a note in Post disturbance, present condition of the percent

3. Stream class. 1-digit code describing the type of stream present. Record for each point on plots with a sample kind of 2, 4, 7 or 8. This item will be downloaded/printed for all sample kind 2 and 7 plots and updated by field crews if necessary. Information on streams is used for identifying forest land that is within the riparian zone. It also provides a data base for evaluating the impact of logging on stream sedimentation. Both a Class 1 and a Class 2 stream may occur within 65 meters of the point. Record the Class 1 stream.

The codes are defined as follows:

<u>CODE</u>	<u>STREAM CLASS</u>
-------------	---------------------

0	No stream present.
---	--------------------

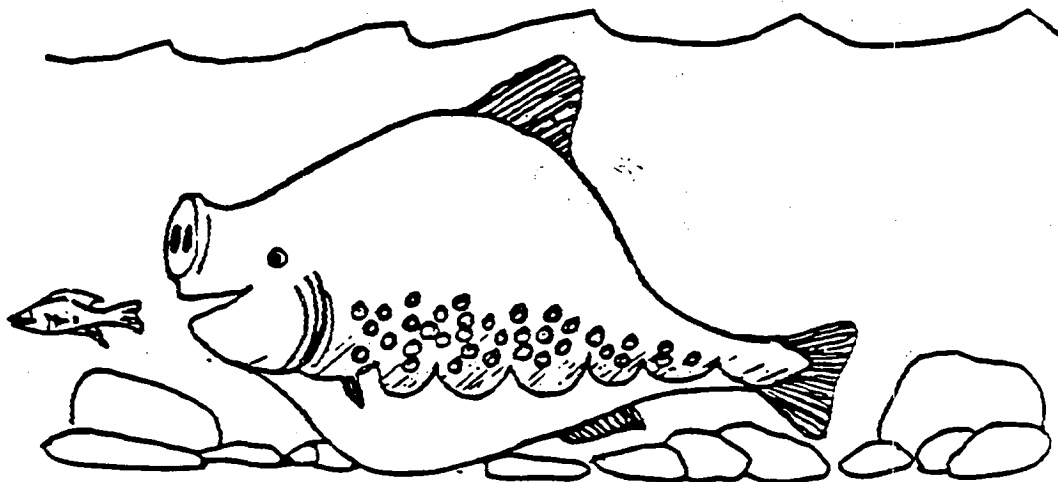
1	Class 1--waters which are valuable for domestic use or important for angling or other recreation and/or used by significant numbers of fish for spawning, rearing, or migration routes. Stream flows may be either perennial or intermittent (e.g. some intermittent coastal streams serve as spawning grounds for salmon during the spring runoff). Includes open bodies of water such as lakes.
---	---

2	Class 2--any headwater streams or minor drainages that generally have limited or no direct value for angling or other recreation. They are used by few, if any, fish for spawning or rearing. Their principal value lies in their influence on water quality or quantity downstream in Class 1 waters. Stream flow may be perennial or intermittent.
---	--

4. Stream Proximity. 2-digit code indicating the horizontal distance in meters from the stream to the point. Record if stream class is required. If a point is substituted at OCC3, estimate the distance from the stream to the center of the original point that requires substitution if the original point center is in the same land and owner classes and stand condition as the field grid location. If point 1 is substituted, the distance is always estimated to the field grid (pinpricked) location.

If point center for points 2 through 5 is in a different land class, or stand condition than the field grid location, or is outside of sampled area, estimate the distance from the stream to the substituted point center.

Record 00 if there is no stream within 65 meter horizontal distance from the point. Allowable codes are 00 through 65.



Example: There is a nice little stream about 4 to 6 meters wide, not too big, but you just know there are trout the size of pigs in under that overhanging brush, and that down stream (the direction you drove from this morning) about a mile is the Sanpoil River. This stream is about half as far away from point 11 as the distance between point 11 and point 74. The appropriate code at point 1 would be "1" for Stream Class and "11" for Stream Proximity.

4. Nonstockable conditions--10-meter fixed-radius plot. In Eastern Washington, we are estimating the extent of nonstockable conditions separately at each N/R or N point on plots with sample kinds 2, 4 or 7 and a ground land class of 20, 41 or 49.

Nonstockable conditions are conditions that preclude normal stocking. These conditions include the presence of a high water table or seasonal standing water, rock or shallow soil over rock, mass soil movements (slips, slides, and slumps), alkali soils, scablands and nonforest inclusions. In general, nonstockable conditions are ~~mosiaced~~--with the exception of some nonforest inclusions--throughout all or much of the plot area, but may not be present on all five 10-meter fixed-radius plots.

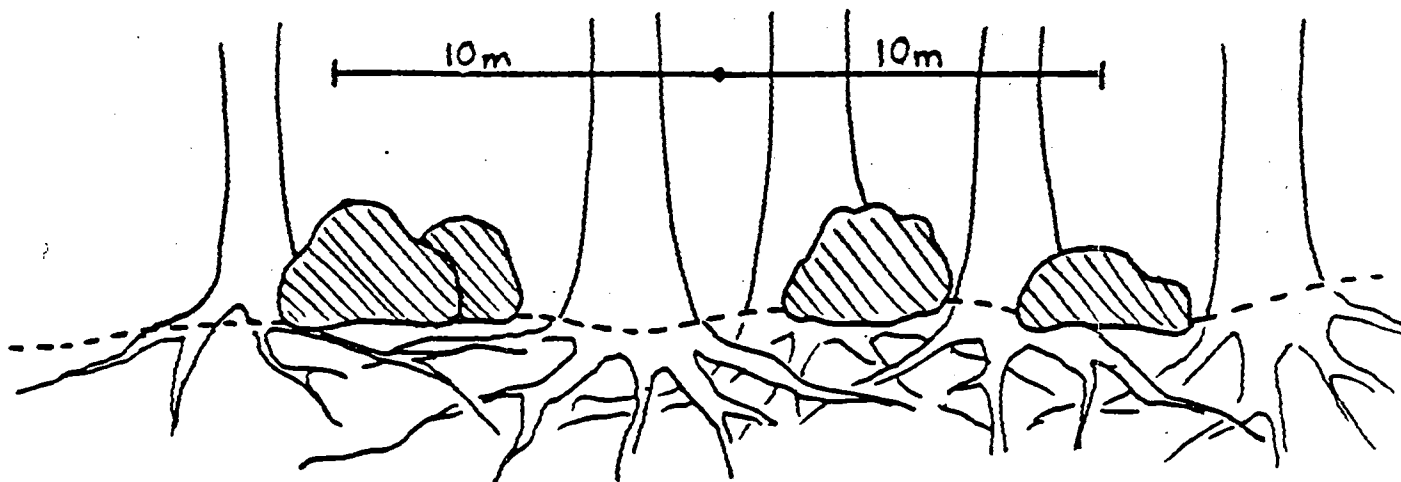
Nonforest inclusions--a category of nonstockable conditions--are areas that are nonforest, but too small in area (< 35 meters wide or < 0.4 ha.) to qualify by FIA definition. Streams less than 5-meters wide, permanent standing water, unimproved roads, severely compacted skid roads and landings are nonforest inclusions. Within nonforest inclusions, the site is incapable of establishing or supporting enough tree stocking to qualify as forest.

Use the root rot card to map and estimate the percentage of the 10-meter fixed-radius plot that qualifies as nonstockable. Refer to the instructions on how to use the root rot card on pages 66-68.

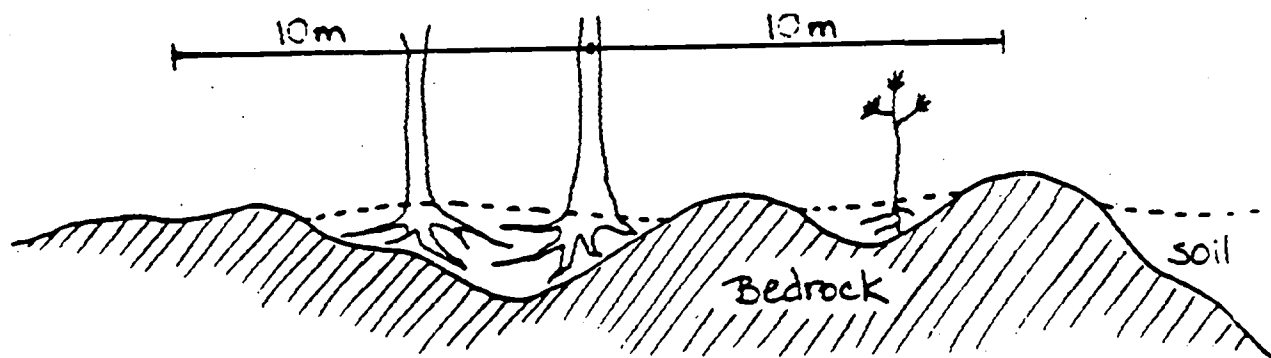
Map and label the kind of nonstockable condition(s) on the point mapping record. Base the percentage estimates on the mapped diagram; each shaded-in square of the grid (3 meter by 3 meter on the ground) represents 3 percent of the area of the 10-meter fixed-radius plot; a half-shaded square represents 1.5 percent.

For every point coded other than zero percent, note the kind of nonstockable condition(s) by point number in "Present condition/Past disturbance" on the plot attribute record.

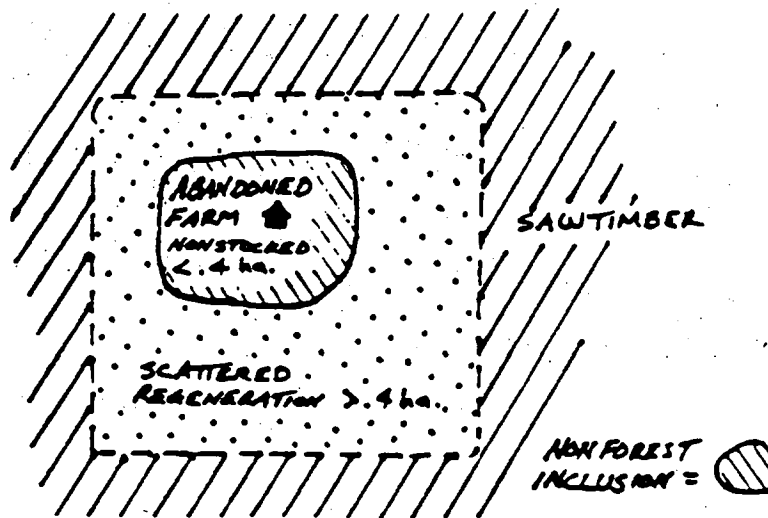
When assessing nonstockable conditions... Record estimates to the nearest 5-percent on the point attribute record. Remember that a 25-percent cover of rocks does not necessarily reduce tree stocking by 25-percent (see examples below). Judge the impact of rockiness, wetness, and soil conditions based on how they would affect a fully stocked stand at maturity. Keep in mind that a fully stocked, mature Douglas-fir stand is more dense than a fully-stocked stand of Oregon white oak. Also, a boulder may reduce the stocking of seedlings but will have no effect on the stocking of a mature stand.



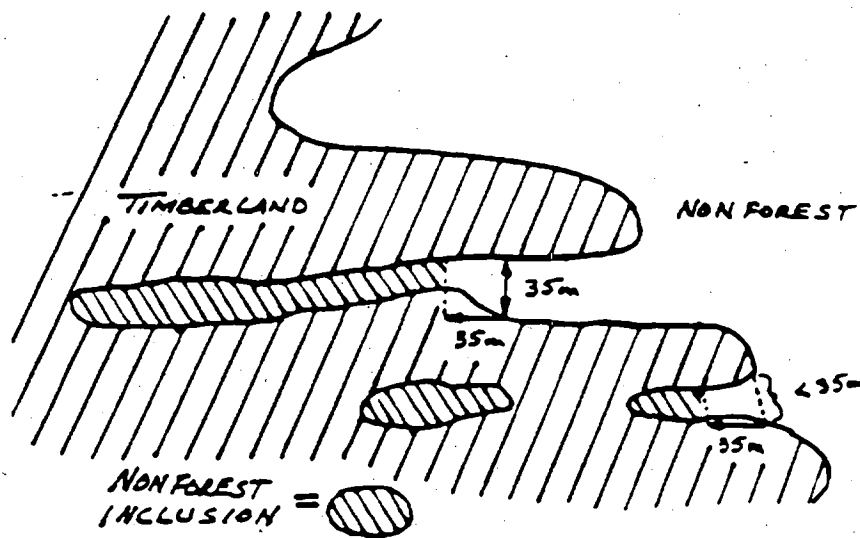
Example: Large, scattered boulders cover 25-percent of the 10-meter fixed-radius plot. However, tree roots can fully utilize the space beneath the boulders. The boulders thus have no effect on tree stocking, and the item is coded "00".



Example: Bedrock outcroppings cover 25-percent of the 10-meter fixed-radius plot. Because of shallow soil conditions, however, tree stocking is reduced by about 50-percent. This item is therefore coded "50."



Example: Nonforest inclusion (old homestead) surrounded by timberland. Keep points in same type. Include nonforest homestead in regeneration type.



Example: Nonforest inclusion near nonforest area. Do not substitute if points fall in this small type.

5. Hardwood site (10-meter fixed-radius plot). Complete for all new (N) and remeasured (N/R) points on plots with a sample kind of 2, 4, or 7 and a ground land class of 20, 41, or 49. Estimate the percent of the 10-meter fixed-radius plot that supports trees but that is incapable of supporting timberland conifers due to the presence of a high water table, standing water, and/or periodic flooding. In addition, if you are completing the point mapping record, map and label the hardwood site area on the diagram for the point. Base your percent cover estimate on the point mapping record. Each shaded-in square of the grid (3 meters by 3 meters on the ground) represents 3-percent of the area of the 10-meter fixed-radius plot; a half-shaded square represents 1.5 percent, and so forth. Do not include area that is totally nonstocked to all trees in your estimate for this item, as this area is accounted for in "nonstockable area".

This item will allow FIA to account for small inclusions of hardwood site within plots that are classified as conifer site (item 25 on the plot attribute record is coded "0"). The information is used in: (1) the analysis of treatment opportunity; (2) evaluating site productivity; and (3) evaluating the percent of the plot area impacted by root disease.

Identifying hardwood site. While hardwood sites can support a variety of plant communities, areas supporting red alder are perhaps the most difficult to distinguish as hardwood site vs. conifer site. Red alder grows both as a wetland and a dryland type; it often grows where timberland conifers will also grow. Red alder may occupy a site for one of the following reasons: (1) the site is too wet to support timberland conifers (this is a hardwood site); (2) the area is capable of supporting conifers, but red alder became established due to conditions favorable for its growth (this is a conifer site); or (3) the area is infected with root disease and will therefore not support susceptible conifer species (this is a conifer site). (The identification of root disease is covered in more detail starting on page 66.)

The presence of conifer stumps in an alder patch often indicates the alder is growing on a dryland conifer site. Alder will also grow in the coastal area in association with such a dense understory as to prevent natural conifer regeneration. In the absence of a high water table or standing water, these areas are also considered conifers sites.

Site conditions favoring red alder. Red alder germinates and grows best on moist mineral soil with full sunlight. The species is an aggressive pioneer on avalanche paths, road cuts, log landings, skid trails, and other areas where mineral soil had been freshly exposed. Red alder also tolerates poorly-drained conditions and some flooding during the growing season. Stands on poorly drained soils are therefore common. Soils supporting wetland communities are saturated, having either a high water table or standing surface water for all or during a major part of the year.

Plant species common on hardwood sites. Hardwood wetlands, in addition to supporting alder, are commonly dominated by willow, Oregon ash, and cottonwood. They often contain a shrubby component of willow, black hawthorne, and stink currant. Associated understory species include skunk cabbage (Lysichitum americanum), lady fern (Athyrium filix-femina), deer fern (Blechnum spicant), sedge (Carex sp.), water parsley (Oenanthe sarmentosa), piggy-back plant (Tolmiea menziesii), hedge nettle (Stachys mexicana), spirea (Spirea douglasii), and bishop cap (Mitella sp.).

Stands of cottonwood, alder, willow, or ash growing on sandy flats along streams are also considered hardwood sites. These areas are subject to heavy flooding that prevents the establishment of conifers.

B. Root disease (10-meter fixed-radius plot). 2-digit code recorded by point on plots with sample kind of 2, 4, or 7 and a ground land class of 20, 41, or 49.

Root diseases, especially laminated root rot, are serious pathogens of conifers in Washington. However, reliable estimates of the extent of timberland area affected are unavailable. The purpose of this root disease assessment is to determine the amount of timberland area affected by root disease. The results will be used to estimate the impact of root disease on Washington's timberland resources.

1. When to collect root disease data. Collect root disease data on the point mapping record and the point attribute record if the ground land class is timberland (GLC=20).

2. How to define and map areas infected by root disease. Assess root disease on a 10-meter fixed-radius plot at each sample point. On each point, estimate the location and extent of root disease areas by using a compass and pacing or measuring distances. Sketch the infection center boundaries on the point mapping record; shade in the infected areas, and label with the appropriate code. More than one disease can occur on a 10-meter fixed-radius plot. The disease codes are as follows:

<u>Code</u>	<u>Causal fungus</u>	<u>Disease</u>
PW	<u>Phellinus weirii</u>	laminated root rot
FA	<u>Fomes annosus</u>	annosus root rot
AM	<u>Armillaria ostoyae(mellea)</u>	armillaria root disease
UK	unknown	--
NO	none present	--

If you find evidence of root disease, but cannot identify the disease, map the affected area as usual and enter "unknown" for the disease code.

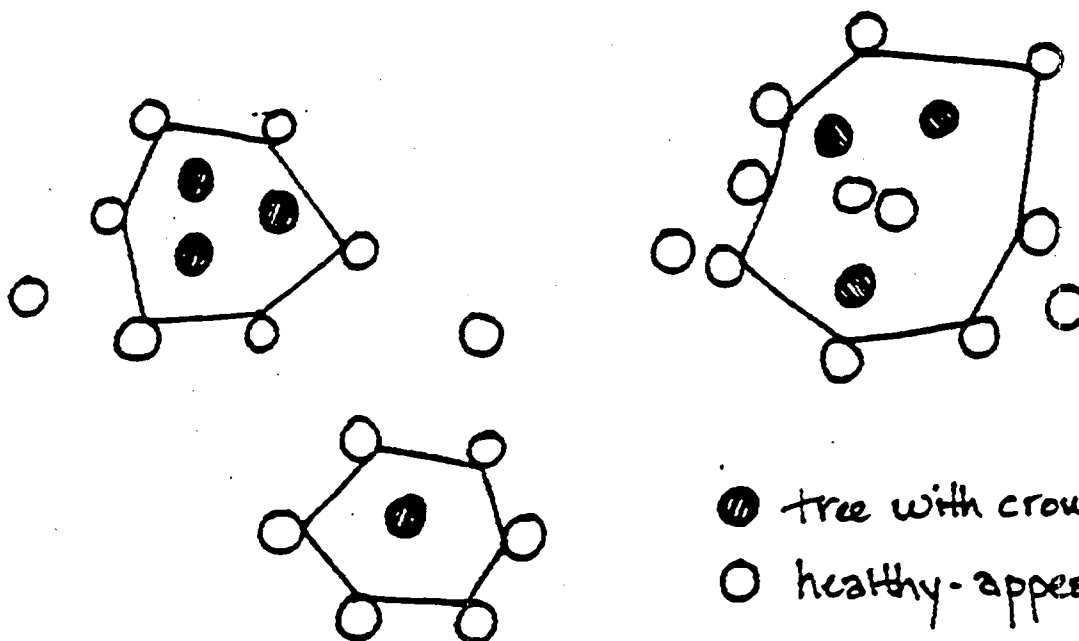
Map and estimate percent cover only for those diseases that are primary causes of tree death. Do not map or estimate percent cover for secondary infections (e.g. Armillaria that invaded a tree that was killed by Phellinus). If you find evidence of a secondary disease, note the situation on the root disease plot card for that point.

Do not map black stain root disease (*Verticilladiella wagneri*). This disease is spread by a vector rather through root contact. If detected on the 10-meter fixed-radius plot simply label its presence with the code "VW".

Define the boundary of an infection center using straight lines connecting the inner bole faces of healthy-appearing trees on the margin of the root disease center. A healthy-appearing tree is defined as follows:

- a.) lacks crown symptoms of root disease (reduced terminal growth increment, thin or yellow crown, distress cone crop);
- b.) has a root disease-infected tree as nearest neighbor on side toward infection center;
- c.) has a healthy tree as nearest neighbor on side away from the infection center.

When defining the boundary, do not consider islands of healthy-appearing trees inside an infection center, as these trees are likely to be infected. The following diagram shows how infection center boundaries would be defined in several situations.



3. Mapping nonstockable conditions, hardwood site, and root disease on the point mapping record.

When mapping the extent of root disease within the 10-meter fixed-radius plot, do not map as diseased, areas that are hardwood site or nonstockable; these areas will not support susceptible tree species. Map areas that are conifer sites with root disease present. Map and label any areas that are hardwood site or nonstockable area on the point mapping record. (See pg. 62 and 65 for more detailed descriptions of nonstockable area and hardwood site).

Estimating and recording percent cover of root disease. For each root disease present, estimate the percentage of the 10-meter fixed radius plot that is infected by each disease. Base estimates on the point mapping record. Each shaded-in square of the grid (3 meters by 3 meters on the ground) represents 3-percent of the area of the 10-meter fixed-radius plot; a half shaded square represents 1.5-percent, and so forth. If no root disease is present, enter "00".

EASTERN WASHINGTON POINT MAPPING RECORD

COUNTY EXAMPLE PLOT 507
DATE 10/19/90
CREW J. BOND, R. DUKE

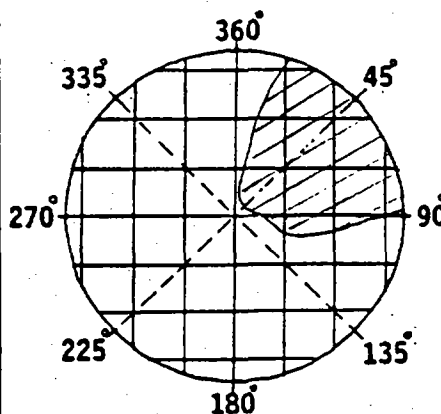
DISEASE CODES

PW = Phellinus (Laminated)
BS = Black stain
AM = Armillaria
PA = Pomes annosus
UK = Unknown
NO = None Present

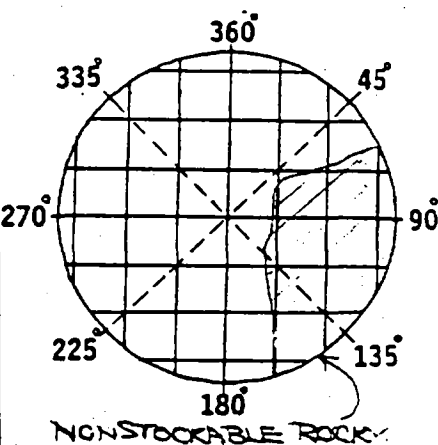


GRID INTERVAL = 3 METERS

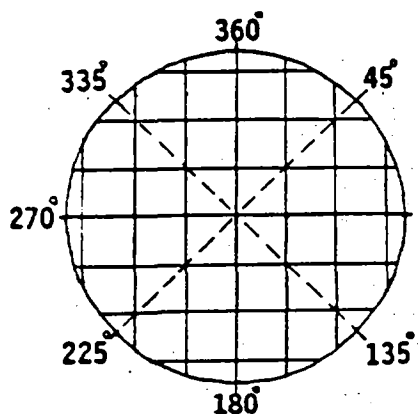
POINT # 11 DISEASE PW



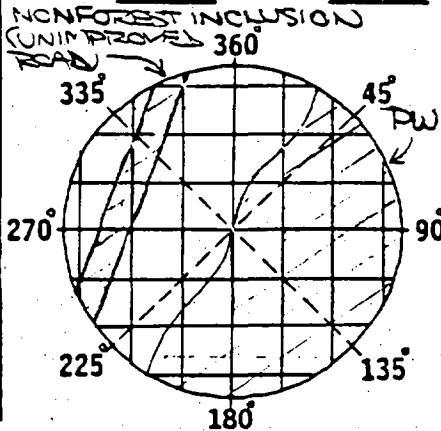
POINT # 32 DISEASE NO



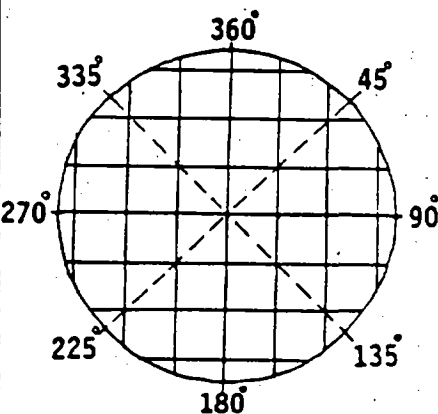
POINT # 53 DISEASE NONE



POINT # 74 DISEASE PW



POINT # 95 DISEASE NONE



4. GUIDE FOR IDENTIFYING MAJOR ROOT DISEASES

General Root Disease Symptoms:

Root disease centers or "pockets" usually appear as patches or groups of dead and dying trees. Trees in all stages of decline (old dead, recent kills, declining) are usually present; old dead trees are found at the center of the pocket, while declining trees occur near the leading edge of the expanding diseased area (in contrast, bark beetle patch kills usually consist of trees that died suddenly and simultaneously with each other). Windthrown trees with decayed roots broken off close to the root collar (root ball) may be evident, except for Black stain root disease, which does not form root balls. Individual trees affected by root disease may exhibit the following above-ground symptoms:

- a.) Reduced height growth increment (as compared to neighboring healthy trees). This results from gradual decline as the root system is slowly destroyed. Look for progressively shorter internodes of the terminal leader.
- b.) Sparse, yellow crowns. Trees infected by root disease fungi often lose needles; needles that remain are often yellow.
- c.) Distress cone crop. In the later stages of decline, infected trees may produce an abundant crop of unusually small cones.

Individual Disease Descriptions:

Laminated Root Rot: Affects all conifers; most commonly Douglas-fir, true-fir, and hemlock. Windthrown trees have decayed roots broken close to root collar, forming root balls. When duff and soil are removed to expose roots, look for grey-white mycelium on the surface of roots--(*Armillaria* will have white mycelium on the inside of roots, between the bark and wood). The mycelium penetrates only the outermost few millimeters of bark, forming a crusty sheath that cannot be rubbed off easily.

Laminated root rot is most easily identified by examining decayed wood which can be found on root balls or in stump hollows. Decayed wood separates readily along annual tree growth rings, hence the name "laminated" root rot. Yellowish-brown decayed wood is usually dry and contains numerous 1 millimeter-long oval pits. Reddish-brown wiry whiskers can usually be found between layers of decayed wood (these are best seen with a 10-x magnifying lens).

Armillaria Root Disease: Affects all conifers and hardwoods. Root balls on fallen trees occur in disease centers. Heavy resin flow near base of tree is common. Chopping into root collar or root will reveal white, fan-shaped mats of mycelium between wood and bark. The mats have a texture that may remind one of peeling partially-dry latex paint off a glass surface (if one has ever done that). The mycelium can penetrate a few millimeters into the inner bark, but is never evident on the outside of the bark or root surfaces (laminated root rot has grey-white mycelium on the outside). Decay in root balls and stumps is soft, spongy, yellowish, stringy, and often contains numerous black lines.

Black Stain Root Disease: The primary host is Douglas-fir, but it can affect hemlock and pines. Infected trees occasionally have resin flow at the base. Brown to black streaks in the **sapwood** (usually in the last 3 to 4 annual rings) of the root collar and roots are the best indication of the disease. You must chop into the wood to diagnose Black stain, it does not occur in or on the bark of the bole or roots. Root balls are not present in Black stain disease centers (unless other root disease is present), because the fungus does not rot roots--it plugs sapwood tracheids causing trees to die standing. The disease is spread by a vector rather than through root contacts.

Annosus Root Disease: Most common on true-fir, pine, and hemlock. Most difficult to identify of the major root diseases. Root balls may be present in disease centers, particularly in true-fir stands. Decay is soft, spongy, white (often with silvery cast) with **black flecks** (like small wild rice grains scattered through the decay). Small bracket-shaped conks may be present in stump hollows or under duff near root collar of infected dead trees or stumps. Annosus is often identified by default--if it is not one of the other root diseases, and if the symptoms suggest root disease and the decay is similar to the description, then it is probably Annosus.

C. Vegetation Profile.

1. Objectives. Information on the structure and species composition of plant communities has many uses. FIA scientists and inventory customers have found such data useful for evaluating wildlife habitat, forage availability, grazing potential, extent and characteristics of forest vegetation, and land productivity in terms of biomass.

2. Sample design. Objectives of the sample design for the OCC3 vegetation profile, and field procedures for meeting them, are listed below. Information on OCC3 procedures is also summarized in the table that follows.

a.) Remeasure the OCC2 vegetation profile wherever one is present; collect new OCC3 information on the points of forest plots where no OCC2 vegetation profile exists. Although the OCC2 vegetation profile included trees as well as shrubs and herbs, we are not remeasuring the tree component of the vegetation profile. Therefore, the OCC2 tree component is not downloaded. At OCC2, vegetation profiles were measured on all 5-point plots. On N/R points at OCC3, we are remeasuring the vegetation profile established at OCC2. On N points we are establishing a new vegetation profile; OCC2 vegetation profiles are not reconstructed on N points.

b.) Estimate the vegetation profile on a 5-meter fixed-radius plot. This general rule was established at OCC2, and is continued at OCC3. (Exception: on other forest plots with a sample kind 8, we are measuring the vegetation profile on a 10-meter fixed-radius plot).

c.) Do not include trees in the vegetation profile UNLESS they are seedlings, or the plot is a sample kind 8. In Eastern Washington, we are calculating density information in the office for trees 2.5 cm d.b.h. and larger, using trackable tree data. Trees of this size are therefore excluded from the OCC3 vegetation profile--except on sample kind 8 plots, where there is no trackable tree tally. Because we do not tally all seedlings present on the fixed-radius plot, seedlings are included in the OCC3 vegetation profile. Record ALL seedling species present on separate lines, even if present only in trace amounts. (Trace amounts are recorded as a percent cover of "01").



SUMMARY OF TALLY REQUIREMENTS FOR OCC3 VEGETATION PROFILE

<u>GLC</u>	<u>Kinds of points</u>	<u>Kind of vegetation</u>	<u>Plot radius</u>
20,41,44,46,49 (5-pt. plot)	N/R, N	Shrubs/herbs + seedlings	5 meters
41,44,46 (1-pt. plot)	N	Shrubs/herbs + all trees	10 meters

3. Percent cover of "all shrubs" and "all herbs." Estimate percent cover as the portion of the fixed-radius plot covered by all plants in the particular plant group. For shrubs, record the percent cover of shrubs of all canopy layers. For herbs, record the percent cover of herbs of all canopy layers. Estimate percent cover as the portion of the fixed-radius plot that would be obscured by all shrub species/all herb species if viewed from directly above the plot. Areas of overlapping shrub crowns (for all shrubs) and herbs (for all herbs) can only be "counted" once. (In other words, percent cover within a group cannot exceed 100-percent). In estimating cover, include the entire area within the general outline of a plant; ignore minor gaps between branches, and holes in the center of the plant.

Record percent cover to the nearest 5-percent, using a two-digit code. If all shrubs or all herbs on a point comprise less than 3 percent cover, record a zero for that item. Record total canopy closure as a "99."

On each sample point, percent cover for a particular plant group should not exceed the sum of percent cover estimates for individual species in that group. The exception is when you have several species present in trace amounts (<5% cover). In many cases, the sum of cover estimates for individual species will be greater than the cover for the group as a whole.

4. Percent cover by plant species and by layer.

a.) General tally procedures. This portion of the vegetation profile provides information on the crown cover of individual species by canopy layer. The vegetation layers referred to here are defined in the following section.

Line entries are grouped separately by trees, shrubs, and herbs. Where present, OCC2 data have been edited for valid codes and printed/downloaded in the appropriate section. On each plot, only one line can be entered for each plant species and canopy layer present. The number of line entries for a particular species may not exceed the maximum allowable number of canopy layers for that plant group: 3 for trees, 2 for shrubs, and 2 for "herbs." On remeasured points, OCC2 species, OCC2 height, and OCC2 percent cover are printed/downloaded. Enter the appropriate OCC3 data on the same line, as described in the following paragraphs.

b.) OCC2 and OCC3 species. Each line entry must have a species code recorded in the "OC2 SPP" and/or the "OC3 SPP" column, using the species codes listed in the plant guide. If you cannot identify a plant species while in the field, collect a sample for later identification. If you cannot identify the species of the plant, record the code for its genus if possible. If not, record one of the following: SHRUB (for any shrub), FORB (for any forb), GRASS (for any graminoid, including grasses, sedges, and rushes), or FERN (for any fern).

5. Plant species that occasionally attain tree size. On the vegetation profile, creek and redstem dogwood (*Cornus* spp.), cascara buckthorn (*Rhamnus purshiana*), and willow (*Salix* spp.) should be tallied as shrubs unless they are, or will become trees. (A tree is defined as a woody plant that commonly has an erect perennial stem or trunk at least 7.5 cm dbh and a total height at maturity of at least 4 meters). Other species (listed on page 87) occasionally attain tree size but are always considered shrubs and are always tallied on the vegetation profile.

6. On remeasured vegetation profiles, compare the printed/downloaded OCC2 species codes with the vegetation on the fixed-radius plot. If OCC2 species is correct, you do not need to enter an OCC3 species. OCC3 data (layer and percent cover) are entered on the same line. There are two conditions under which the OCC2 species must be updated. In the following cases, record the updated species in the "OC3 SPP" column; never delete the OCC2 species code.

a.) If the species was obviously misidentified at OCC2, record the correct species in the OCC3 species column. OCC3 data are entered on the same line as the OCC2 data.

b.) At OCC2, plant species were often identified according to broad groups: "grass" (recorded as a "1" on the OCC2 plot card), "grasslike" (2), "forbs" (3), or "shrubs" (4)). Where possible, record the genus and species for these entries in the "OCC3 species" column, and enter the OCC3 data on the same line as the OCC2 data.

If more than one individual plant species were grouped together in one of these line entries, add new, separate lines for them. On the added lines, complete the OCC2 as well as the OCC3 percent cover columns. For each sample point, the sum of the OCC2 percent covers of the two or more added lines should equal the OCC2 percent cover of the line that is being replaced. Do not record any OCC3 data on the line that is being replaced.

Adding new species. If a species was obviously missed at OCC2, add a new line for it. The OCC2 percent cover for missed species equals the OCC3 percent cover. If there is a new species present that was not present at OCC2 ("ingrowth"), add a new line entry. Record OCC2 percent cover as zero for "ingrowth" species.

c.) OCC2 height (dm). 3-digit code, printed/downloaded, that indicates the height recorded by the OCC2 field crew. This item is provided for the OCC3 field crew's information, and should not be updated. Correct OCC3 heights should be reflected in the layer code (see following).

d.) Canopy layer. Record a 1-digit canopy layer code for each line entry. The code indicates the height of the species at OCC3. The codes correspond to the canopy layers described on page 75.

e.) Percent cover. Record percent cover to the nearest 5 percent, using a 2-digit code. Do not record shrubs or herbs with less than 3 percent cover; tree seedlings can be recorded in trace amounts (code percent cover as "01"). Record total canopy closure as a "99."

(1) General rules. For each line entry and sample point, estimate percent cover as the portion of the fixed-radius plot that would be obscured by all plants of the species and layer if viewed from directly above the fixed-radius plot. Areas of crown overlap by plants of the same species and layer can only be "counted" once. (In other words, percent cover within a species/layer cannot exceed 100 percent). In estimating cover, include the entire area within the general outline of a plant; ignore minor gaps between branches, and holes in the center of the plant.

(2) OCC2 and OCC3 percent cover on remeasured points. For each species and height on the plot, the percent cover estimates recorded at OCC2 have been printed/downloaded. For these species, examine current conditions on the fixed-radius plot to see if "substantial change" (defined below) has occurred. If yes, record the current percent cover of the species in the OCC3 percent cover column. If no, record the same percent cover for OCC3 that is printed/downloaded for OCC2.

Substantial changes in percent cover since OCC2 are usually the result of a disturbance in the plot area between OCC2 and OCC3, or just prior to OCC2. Examples of common disturbances are: timber harvest and management activities, grazing, natural events such as windthrow, insect kill, flooding, and fire. Substantial changes can also occur in the absence of any discernible disturbance, and should be recorded.

In general, a change in percent cover should only be recorded if the OCC3 estimate differs from the OCC2 estimate by at least 20-percent cover. We cannot be sure if differences of less than 20-percent cover are due to real change or to differences in the estimators (ocular estimates of cover are imprecise).

Changes of less than 20 percent can be coded under certain circumstances:

- If you can determine that the vegetation has changed as a direct result of real, physical disturbance in the plot area, you may code a change of less than 20 percent.
- If the OCC2 percent cover was coded as equal or less than 30, recognize changes in cover in increments of 10 percent.
- If a shrub or herb species was not recorded at OCC2, and is now present with at least 3 percent cover, record it. Similarly, record tree seedlings present with at least one-percent cover. For species obviously missed at OCC2, record a percent for OCC2 as well OCC3. Record an OCC2 percent for seedlings if they were present at OCC2.

7. Heights of canopy layers. Record height as a 3-digit code to the nearest decimeter.

Tree layers.

a.) Sample kinds 2-7. On all 5-point plots, only one tree layer can be recorded as present. This is because only seedlings are included on the vegetation profile on these plots.

b.) Sample kind 8. On 1-point plots, up to three layers may be present. Determine how many distinct layers of trees are present on the 10-meter fixed-radius plot. These canopy layers are the basis for the estimates of percent cover recorded on the vegetation profile. Heights of tree layers must differ by at least 5 meters to be considered "distinct." Record the average height of the plants in each of the layers.

(1) Height of tree layer 1. Record a 3-digit code that describes the average height of all trees in the tallest canopy layer.

(2) Height of tree layer 2. Record a 3-digit code that describes the average height of all trees in the second-tallest canopy layer.

(3) Height of tree layer 3. Record a 3-digit code that describes the average height of all trees in the third-tallest canopy layer.

Shrub layers. Determine if there are one or two layers of shrubs present in the plot area. Heights of shrub canopy layers must differ by at least 1 meter to be considered "distinct." A plot may have a maximum of two shrub layers. As you complete the plot, you may want to adjust these heights to more accurately reflect the layers present on the five fixed-radius plots.

a.) Height of shrub layer 1. Record a 3-digit code that describes the average height of all shrubs in the tallest canopy layer present in the plot area. If no shrubs are present, record a zero for this item.

b.) Height of shrub layer 2. Record a 3-digit code that describes the average height of all shrubs in the shortest canopy layer. If fewer than 2 canopy layers are present record a zero for this item.

Herb layers. Determine if there are one or two layers of herbs (all non-tree and non-shrub vegetation) present in the plot area. Heights of these layers must differ by at least 5 decimeters to be considered "distinct." A plot may have a maximum of two herb layers. As you complete the plot, you may want to adjust these heights to more accurately reflect the layers present on the five fixed-radius plots.

a.) Height of herb layer 1. Record a 3-digit code that describes the average height of all herbs in the tallest layer present in the plot area. If no herbs are present, record a zero for this item.

b.) Height of herb layer 2. Record a 3-digit code that describes the average height of all herbs in the shortest layer present in the plot area. If fewer than 2 layers are present, record a zero for this item.

Remember to record all shrub and herb species that are ≥ 3 percent in cover.

E. Yew seedling tally. On the vegetation profile fixed-radius plot, record the number of Pacific yew seedlings present. The Husky will prompt a specific question asking for this information on each fixed-radius plot (5-meter radius on sample kinds 2, 4 and 7, and 10-meters on sample kind 8).

Taxol, a substance extracted from yew bark shows promise in treating cancer. Demand for this chemical raises questions concerning the future of Pacific yew. The tally will aid in assessing yew regeneration.

VII. TRACKABLE TREE TALLY

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VIII. TRACKABLE TREE TALLY

A. Tree selection. The objective of the trackable tree tally is to obtain information on the volume, growth, mortality, harvest, and tree and stand characteristics within the plot area.

Tally tree definitions

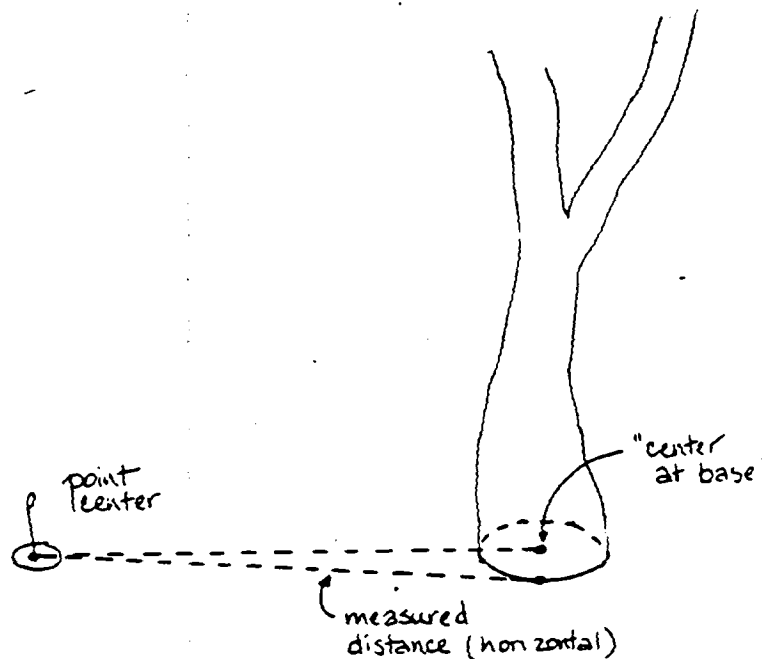
Seedling: A tree less than 2.5 cm dbh that is at least 15 cm in height and established in mineral soil. Includes trees with a height less than 1.37 m.

Sapling: A tree 2.5-12.4 cm dbh.

Poletimber: A tree 12.5 cm to 22.4 cm dbh.

Sawtimber: A tree 22.5 cm dbh or larger.

2.1 meter fixed-radius plot Seedlings and saplings are more efficiently sampled using a fixed-radius plot than a variable-radius (prism) plot. The 2.1-meter radius represents the limiting distance (40 BAF--English units) of a tree with a 12.4 cm dbh. Tally trees when the center of the base is within 2.1 meters of point center



1. Tree selection on 2.1-m fixed-radius plots--Sapling tally (2.5-12.4 cm dbh)

a.) N/R points (remeasured plots--SK 2 and 7)--On N/R points on remeasurement plots, any tree tallied live at OCC2 has a displayed OCC2 dbh; if tallied live at OCC1, OCC1 dbh is also displayed.

Account for all trees tallied live at OCC2 on the 2.1-m fixed-radius plot. These trees could be ≥ 12.5 cm dbh at OCC3. Treat these trees as follows:

- If still alive, the tree history is 1.
- If culturally-killed or harvested since OCC2, the tree history is 3.
- If dead since OCC2, the tree history is 5.

Tally any tree live and ≥ 2.5 cm dbh at OCC3 on the 2.1-meter fixed-radius plot that has no displayed OCC2 record.

- If a tree that germinated since OCC2, the tree history is 4.
- If a live, untallied seedling at OCC2, the tree history is ~~3~~ and the tree requires backdating (reconstruction) to OCC2. ₆

Tally any tree on the 2.1-meter fixed-radius plot that was live and 2.5 to 12.4 cm dbh at OCC2 but missed at OCC2. Reconstruct these trees to OCC2.

- If still alive, the tree history is 6.
- If culturally-killed or harvested since OCC2, the tree history is 3.
- If dead since OCC2, the tree history is 5.

b.) N points (SK 2, 4, and 7)--Tally all trees live and 2.5 to 12.4 cm dbh at OCC3 on the 2.1-meter fixed-radius plot.

- If present at OCC2 the tree history is 2 and the tree requires backdating to OCC2.
- If the tree did not exist at OCC2, the tree history is 4.

Tally any tree on the 2.1 meter fixed-radius plot that was live and 2.5 to 12.4 cm dbh at OCC2 that was culturally-killed or died since OCC2. Reconstruct these trees to OCC2.

- If culturally-killed since OCC2, the tree history is 3.
- If dead since OCC2, the tree history is 5.

2. Tree selection on 2.1-m fixed-radius plots--Seedling tally (< 2.5 cm dbh)

a.) N/R points on remeasurement plots (SK 2 and 7) Account for seedlings tallied live at OCC2 regardless of whether these trees, if still live, are needed to bring the number of live trees < 12.5 cm dbh at OCC3 to 4 on the 2.1-meter fixed-radius plot. Treat these trees as follows:

If still live and still a seedling at OCC3 and needed and qualified to bring the number of live trees < 12.5 cm DBH on the fixed-radius plot to 4, tree history is 1 (see the section "Qualifications for seedlings").

If culturally-killed since OCC2, the tree history is 3.

If dead since OCC2, the tree history is 5.

If live, still a seedling but not needed or not qualified for seedling tally on the fixed-radius plot, keep and update the seedling and add an additional qualified seedling if available. You could end up with more than 4 seedlings tallied at OCC3. The tree history on the seedling originally tallied at OCC2 is 1.

If--after accounting for seedlings tallied live at OCC2--the tally of trees that are live and < 12.5 cm dbh at OCC3 is less than 4, tally additional seedlings, if present, until the total live tally on the 2.1-m fixed-radius plot is 4. These seedlings must meet the criteria specified in "Qualifications for seedlings". Assign tree history 6 and reconstruct if present at OCC2. Assign tree history 4 if not present at OCC2.

If you have a seedling tallied at OCC2 that should not have been tallied (failed to qualify at OCC2 given current rules), delete the seedling by entering a tree history of 0.

b.) N points (SK 2, 4, and 7)--If the tally of trees that are live and 2.5 to 12.4 cm dbh at OCC3 on the 2.1-meter fixed-radius plot is less than 4, tally seedlings, if present, until the total live tally on the the 2.1-meter fixed-radius plot is 4 trees; seedlings must meet the criteria specified in "Qualifications for seedlings". Assign tree history 2 and backdate to OCC2 if present at OCC2. Assign tree history 4 if the seedling did not exist at OCC2.

c.) Qualifications for seedlings:

- (1) The seedling must be capable of living at least 10 years.
- (2) Do not tally conifers that will be overtopped by other conifers in the stand before they reach 22.5 cm in dbh. (ignore residual overstory trees and sawtimber trees overtopping a tolerant understory.)
- (3) If a seedling is dominant or codominant and less than 1.37 meters tall, it must be at least 0.5 meters from any other tally tree. If a seedling is intermediate or overtopped and any height, it must be 0.5 meters from any other tally tree.
- (4) Tally seedlings according to the following priorities:
 - (1) conifer other than cedar or pacific yew.
 - (2) cedar
 - (3) red alder or cottonwood
 - (4) all other hardwoods
- (5) Do not tally yew, dogwood or species coded 999.
- (6) Within species groups, tally in order of dominance.
- (7) One maple seedling may be tallied from a maple clump provided no other stem in clump has been already tallied.

3. Data recording--2.1 meter fixed-radius plot. Record one line for each tree. Complete the required items as indicated in the tally guide.

N/R points on remeasured plots (SK 2 and 7)--Data for trees tallied on the 2.1-meter fixed-radius plot at occasion 2 are printed on a computer-generated OCC3 tally sheet and downloaded into the Husky. If no trees (including reference trees) were tallied at OCC2, nothing is downloaded or displayed for the point.

If no trees other than reference trees or snags are tallied at either occasion, record a new line with a tree history of 0 and enter "No tally" in remarks.

N points on remeasured or new plots (SK 2, 4 and 7)--If no trees other than reference trees and snags are recorded at OCC3, record a new line with a tree history of 0 and enter "no tally" in remarks.

40 BAF variable-radius plot: Pole and sawtimber trees (> 12.5 cm dbh) are sampled more efficiently with variable-radius sampling than with fixed-radius plot sampling. The basal area factor used in the Eastern Washington inventory is 40 square feet per acre (9.18 square meters per hectare). In the Eastern Washington inventory, there is no fixed-radius plot for large diameter trees.

4. Tree selection on the 40 BAF variable-radius plot.

a.) N/R points:

On plots fully-remeasured at OCC2 (SK 2), trees that were tallied live and > 12.5 cm dbh at OCC2 have a printed or downloaded OCC2 dbh; the OCC1 dbh is printed or downloaded if the tree was also tallied at OCC1.

Trees tallied on OCC2 walk-thru plots (SK 7) as live and > 12.5 cm dbh at OCC2 have their OCC1 dbh but not OCC2 dbh printed or downloaded. In place of the actual OCC2 dbh, ">124" will be downloaded; this indicates that the tree was live variable-radius tally on an OCC2 walk-thru plot.

On OCC2 walk-thru plots, it's not important that an OCC2 dbh for such trees is less than the OCC1 dbh or greater than the OCC3 dbh. The OCC2 dbh was derived using regression estimators, and these OCC2 dbhs will be replaced with new OCC2 dbh's derived by interpolating between measured OCC1 and OCC3 dbhs.)

Account for all trees tallied live and > 12.5 cm dbh at OCC2. Treat these trees as follows:

- If still alive, the tree history is 1.
- If culturally-killed since OCC2, the tree history is 3.
- If dead since OCC2, the tree history is 5.
- If harvested since OCC2, the tree history is 8.

Tally any tree that was "out" at occasion 2 that is: live and > 12.5 cm dbh at OCC3, outside of the 2.1-meter fixed-radius plot, and now within the limiting distance for BAF 40. Assign the tree history 2. If the tree was a reference tree at OCC2 (TH=9), retain the line and change the tree history; Husky will recognize the OCC2 dbh and prompt for other required variables. Boring for increment is not required unless OCC2 dbh is unreasonable.

Tally and reconstruct any tree live and > 12.5 cm dbh at OCC2 that was within the limiting distance but missed on a plot fully measured at OCC2. *Applies only on an N/R point on a sample end plot*

- If still live, the tree history is 6.
- If culturally-killed since OCC2, the tree history is 3.
- If dead since OCC2, the tree history is 5.
- If harvested since OCC2, the tree history is 8.
- If the tree was a reference tree (TH=9), retain the line and change the tree history; Husky will recognize the OCC2 dbh and prompt for other required variables. Boring for increment is not required unless OCC2 dbh is unreasonable.

If a mortality tree qualifies as a snag, record a separate line with a tree history 7. Assign the line number for the mortality tree to the line for the snag.

Use the prism to identify trees that are clearly "in" or "out." Use the following method to check all other trees. Refer to the diagram on the previous page.

- (1) Drive a nail into the tree at breast height (point C), at a location that is perpendicular to the sample point.
- (2) With a tape, measure the slope distance from point C to point A.
- (3) Using a clinometer, measure the slope along this line (sighting from point C to point A). Use the slope correction table on page 143 to calculate the actual horizontal distance from C to A; this distance equals the distance from B to D.
- (4) Compare this calculated horizontal distance with the limiting distance for a tree of that dbh. If the actual distance is less than the limiting distance, the tree is "in." If the actual distance is greater than the limiting distance, the tree is "out."

Limiting distances by diameter are presented in a table on page 144. The limiting distance for a particular tree may also be calculated using the following equation:

$$L = 0.165 \times \text{dbh} \quad \text{where: } L = \text{limiting distance in meters;} \\ \text{dbh} = \text{diameter at breast height in centimeters}$$

B. Tree identification and measurement. Refer to the tally guides (Appendix 8) to determine what items to complete for a particular kind of tree. Tree data printed on the trackable tree tally record is from OCC2 for all tree histories.

1. Item 1--Line number (LINE). 5-digit code printed on the trackable tree tally record for OCC2 tally trees. New tally trees are assigned a line number by the Husky. This code is used in data compilation and will not be changed by the field crew. The same line number is used twice if a culturally killed tree (TH 3) or mortality tree (TH 5) qualifies and is entered as a snag (TH 7) at OCC3.

2. Item 2--Point number (PT): A two-digit code recorded for all trees on all points. During downloading, points visited at OCC2 are assigned the two-digit point numbers. The first character is the OCC2 point number (0-9); the second character is an assigned OCC3 point number (0-5). The second (OCC3) number correlates in ascending order with the first (OCC2) number. On a remeasured plot (SK 2 or 7) with a standard layout at OCC2 and 3, the point numbers are 11, 32, 53, 74, and 95.

a.) N/R points are points on remeasured plots (SK=2 and 7, and remeasured SK=8) that were visited at OCC2 and qualify for remeasurement at OCC3. On these remeasured points, On a NR point, **do not change the downloaded number.**

b.) N points are points that are installed new at OCC3. An N point is recorded as a two-digit code: the first character is the letter "N"; the second character is the OCC3 point number (1-5). When a point is substituted or can not be found on a remeasured plot, the second digit on the new point is the same as the assigned second digit of the point being replaced.

All points installed on lost, missing or new plots (SK 4) are N points. New one-point vegetation profile plots (SK 8) are N points (N1).

N points are installed on remeasurement plots (SK 2 and 7) when OCC2 points require substitution or can not be found.

Tree tally on all N points is reconstructed for OCC2 except on one-point vegetation profile plots.

2. Item 3--Tree history (TH). 1-digit code needed for all trees. A "1" will be printed for all trees tallied live at OCC2; change the printed code if the tree is dead, culturally-killed or harvested. Record a 1-digit code if the tree was not tallied at OCC2.

Code	Tree History	Description
0	No tally	Enter a line with this tree history if: a nonforest plot, a one-point forest plot, or a point on a five-point forest plot with only snags, stumps and/or reference trees present.
1	Remeasured	Tree tallied live at OCC2 and still live at OCC3.
2	New on N pt.	Live tree tallied on an N point at OCC3. Live at OCC2.
2	New on N/R pt.	Live tree tallied for the first time at OCC3; not on 2.1-meter fixed-radius plot; tree is ≥ 12.5 cm dbh at OCC3; in on the variable-radius plot. (Ongrowth tree)
3	Culturally-Killed	Tree tallied or reconstructed as live at OCC2, but now killed. Include tree tallied or reconstructed as live and < 12.5 cm dbh at OCC2 and now killed. Tree was not harvested. Can be a stump or a standing or felled tree. Include trees killed in logging but not felled.
4	OCC3 Ingrowth	Tree tallied live at OCC3 on 2.1-meter fixed-radius plot; not alive at OCC2. Includes additional stocking seedlings not alive at OCC2. Can be ≥ 12.5 cm OCC3 dbh.
5	Mortality	Tree tallied or reconstructed as live at OCC2 but now dead. Death was natural and not due to human activity. Include partially uprooted windthrows leaning more than 45 degrees. Include seedlings tallied live at OCC2 but now dead. If the dead tree qualifies as a snag, record a separate line with a tree history 7 and complete required items.
6	Missed tree or add. seedling	Live tree missed on an N/R point (SK 2) that should have been tallied at OCC2. Or an additional stocking seedling at OCC3--present but not qualified for tally at OCC2. Requires reconstruction at OCC2. <i>On an untallied seedling at OCC2 that is now ≥ 2.5 cm dbh.</i>
7	Snag	Includes (1) a snag ≥ 22.5 cm dbh and ≥ 2 meters tall tallied on a N point; (2) a snag tallied at OCC2 and still ≥ 22.5 cm dbh and ≥ 2 meters tall at OCC3; (3) a tree tallied live at OCC2 but now dead, ≥ 22.5 cm dbh and ≥ 2 meters tall; (4) and a snag tallied at OCC2 but now gone, < 22.5 cm dbh or < 2 meters tall at OCC3.
8	Harvested	A tree tallied or reconstructed as live and ≥ 12.5 cm dbh at OCC2, but now harvested for industrial supply, firewood, local use or incidental reasons.
9	Reference	Nontally reference only.

4. Item 4--Species (SPC). 3-digit code, printed/downloaded on the trackable tree tally record for trees tallied at OCC2. Change the printed/downloaded code if the species was misidentified at OCC2 and note "species misidentified" in remarks column. Record a 3-digit code for all new trees.

<u>Code</u>	<u>Species</u>	<u>Code</u>	<u>Species</u>
011	Pacific silver fir	312	Bigleaf maple
017	Grand fir	351	Red alder
019	Subalpine fir	352	White alder
022	Noble fir	361	Pacific madrone
042	Alaska yellow-cedar	376	Western paper birch
064	Western juniper	492	Pacific dogwood
072	Subalpine larch	542	Oregon ash
073	Western larch	600	Walnut
093	Englemann spruce	660	Apple
101	Whitebark pine	746	Quaking aspen
108	Lodgepole pine	747	Black cottonwood
119	Western white pine	760	Cherry
122	Ponderosa pine	815	Oregon white oak
202	Douglas-fir	999	Other trees (identify in remarks) or unknown. May include willow, creek and redstem dogwood and cascara buckthorn.
231	Pacific yew		
242	Western red cedar		
263	Western hemlock		
264	Mountain hemlock		

Tally individuals of the following species as trees if they are, or will become, trees. If tallied, the species code is 999; record the species name in "remarks". (A tree is defined as a woody plant that commonly has an erect perennial stem or trunk at maturity at least 7.5 cm dbh and a total height of at least 4 meters.)

Creek and redstem dogwoods (Cornus spp.)
 Cascara buckthorn (Rhamnus purshiana)
 Willow (Salix spp.)
 Chokecherry (Prunus virginiana)

Although the following species occasionally attain tree size, they are always considered shrubs and are not tallied as trees.

Vine maple (<u>Acer circinatum</u>)	Ceanothus (<u>Ceanothus spp.</u>)
Mountain maple (<u>Acer glabrum douglasii</u>)	Red o/ter birch (<u>Betula occidentalis</u>)
Douglas maple (<u>Acer glabrum douglasii</u>)	Bog birch (<u>Betula glandulosa</u>)
Indian plum (<u>Osmaronia cerasiformis</u>)	Silktassel tree (<u>Garryana spp.</u>)
Ocean spray (<u>Holodiscus discolor</u>)	Rhododendron (<u>Rhododendron spp.</u>)
Hazel (<u>Corylus spp.</u>)	Poison-oak (<u>Toxicodendron spp.</u>)
Mountain ash (<u>Sorbus spp.</u>)	Klamath plum (<u>Prunus subcordata</u>)
Thinleaf alder (<u>Alnus tenuifolia</u>)	Serviceberry (<u>Amelanchier spp.</u>)
Sitka alder (<u>Alnus sinuata</u>)	Mockorange (<u>Philadelphus spp.</u>)
Elderberry (<u>Sambucus spp.</u>)	Arrowwood or moosewood (<u>Viburnum spp.</u>)
Manzanita (<u>Arctostaphylos spp.</u>)	Hawthorne (<u>Crataegus spp.</u>)
Ninebark (<u>Physocarpus spp.</u>)	
Mountain mahogany (<u>Cercocarpus spp.</u>)	

5. Monumenting information. Azimuth, distance, and tree number is used for relocating and remeasuring tally trees and point-level variables.

a.) Item 5--Azimuth (AZM). 3-digit code describing the azimuth from point to tree. Required on all live OCC3 tally trees including seedlings, and on the trees that reference the points. Record to the nearest degree. Code a north azimuth as "360". Printed or downloaded for trees tallied live that were \geq 2.5 cm dbh at OCC2 and for OCC2 reference trees; updating is required when the printed/downloaded azimuth is significantly in error or when the tree is a reference tree.

b.) Item 6--Distance (DIST). 4-digit code indicating the slope distance, in centimeters, from the point to the head of the nail that affixes the tree number tag. Required on all live OCC3 tally trees including seedlings, and on the trees that reference the points.

Printed and downloaded for trees tallied live at OCC2 that were \geq 12.5 cm dbh and for OCC2 reference trees. Updating is required when the printed/downloaded code is significantly in error on a current live tally tree. Beware of back azimuths recorded at OCC2. Correct if the tree is still live.

Distances must be measured at OCC3 if the tree references a point. Distance for non-reference tally trees may be estimated. Estimated distances must end with a "0"; measured distances must end with a number other than "0".

c.) Item 7--Tree number (TRN). 3-digit code. Tree numbers of 001-999 are valid codes. Printed or downloaded on the trackable tree tally record for remeasured trees tallied live and \geq 12.5 cm dbh at OCC2. Required at OCC3 on all live tally trees \geq 12.5 cm dbh.

Tag the following trees: All trees tallied live and \geq 12.5 cm dbh at OCC3 must be marked with an aluminum tree number tag.

If a live tally tree was tagged at OCC1 or OCC2, reuse the old tree number tag or attach a new one. If you reuse the old tag, make sure it is below stump height and is on the side of the tree facing the point. If reused, pull it out far enough so it will not be overgrown in the next ten years. If more convenient to attach a new tree number tag, discard the OCC2 tag. If it cannot be removed, pound the tag flush against the tree so it will soon be overgrown and not confused with the OCC3 tree number tag.

If a tree requires a tag for the first time at OCC3, nail a new tag to the tree below stump height on the side of the tree facing the point. Drive the nail in only as far as necessary to firmly anchor it in the wood.

Do not use the same tree number more than once on the same plot! Before leaving the vehicle, make sure the printed tree numbers for remeasured trees are not the same series as those you plan to use for new trees.

Recording tree number. For remeasured trees that were tallied live and \geq 12.5 cm dbh at OCC2, this item is printed/downloaded. Change the printed/downloaded code if a tree is assigned a new tree number tag. For trees receiving a tag for the first time, enter the number.

6. Item 8--OCC3 INCREMENT (OC3 INC) The details on when this item is recorded is specified in the instructions for OCC1 DBH (Item 9) and OCC2 DBH (Item 10). OCC3 increment is recorded in this item only for the period between OCC2 and OCC3.

7. Item 9--OCC1 DBH (OC1 DBH) OCC1 dbh is printed/downloaded on the trackable tree tally for trees tallied live at OCC1 and OCC2 on N/R points.

OCC1 dbh requires attention if the tree is still live at OCC3 and the downloaded/ printed OCC1 dbh is greater or unreasonably less than the OCC3 dbh. If OCC3 dbh is > 12.5 cm and the tree is a conifer, bore for increment to correct the OCC1 dbh and to backdate the OCC2 dbh. If the tree is < 12.5 cm dbh at OCC3 or is a hardwood, do not bore for increment; just estimate diameter(s). Record the corrected OCC1 dbh in item 9 and the backdated OCC2 dbh in item 10. Record the radial increment (inside bark) for the period between OCC1 and OCC3 in the remarks column: "OCC1-3 inc=...". Enter the increment for the period between OCC2 and OCC3 in OCC3 increment (Item 8). For more help, see "How to bore for increment" on page 90.



8. Item 10--OCC2 dbh (OC2 DBH). This item is printed/downloaded on the trackable tree tally for the following trees on N/R points:

a.) trees tallied live at OCC1 with OCC1 DBHs ≤ 12.4 cm dbh that were live tally at OCC2.

b.) trees tallied live at OCC2 for the first time with OCC2 dbhs ≤ 12.4 cm dbh.

c.) trees tallied live at OCC2 for the first time with OCC2 dbhs ≥ 12.5 cm dbh on plots with sample kind 2 (fully-remeasured at OCC2).

OCC2 dbh is not printed/downloaded for trees tallied live at OCC1 and OCC2 with OCC1 dbhs ≥ 12.5 cm dbh on OCC2 walk-through plots. For these trees, ">124" is downloaded as OCC2 dbh to indicate that the tree was estimated greater than 12.4 cm dbh at OCC2.

The OCC2 dbh requires attention if:

a.) ...a tree is live, remeasured at OCC3, and has a printed/downloaded OCC2 dbh that is larger or unreasonably less than OCC3 dbh. If OCC3 dbh is > 12.5 cm dbh and the tree is a conifer, bore for increment (past the depth of OCC1 dbh) to correct OCC2 dbh. If, after correcting OCC2 dbh, OCC1 dbh is larger or unreasonably less than the OCC2 dbh, use the increment core to correct the OCC1 dbh. If the tree is less than 12.5 cm dbh at OCC3 or is a hardwood, simply estimate diameter.

b.) ...a tree has an OCC3 tree history is 2 or 6. If OCC3 dbh is ≥ 12.5 cm and the tree is a conifer, bore for increment to estimate OCC2 dbh; if a hardwood, simply estimate OCC2 dbh. If the tree is less than 12.5 cm dbh at OCC3, estimate OCC2 diameter. If the tree was < 2.5 cm dbh at OCC2, record the OCC3 dbh as the diameter increment for the period between OCC2 and 3 in remarks. If a conifer is ≥ 12.5 cm dbh at OCC3 but was < 2.5 cm dbh at OCC2, bore for breast-height age. If the tree was not present at OCC2, record 0000 for OCC2 dbh. If the tree was a reference tree only and the OCC2 dbh is reasonable, accept it (no boring required).

The OCC2 dbh requires attention if:

c.) ...a tree is reconstructed live and "in" at OCC2 and now culturally-killed (TH 3), dead (TH 5) or harvested (TH 8) on a new (N) point or on a remeasured (N/R) point as a missed tree. Measure and record the current diameter as the OCC2 dbh. If now a stump, estimate OCC2 dbh based on the stump.

d.) ...a snag (TH 7) is reconstructed as a snag "in" at OCC2 and 3. Measure or estimate, and record the current dbh as OCC2 dbh and OCC3 dbh.

e.) ...a snag has an OCC2 dbh that is less than OCC3 dbh. Check the OCC3 dbh. If OCC2 dbh is still less than OCC3 dbh, set OCC2 dbh equal to or slightly more than OCC3 dbh.

If OCC2 dbh is based on a bored increment, record the radial increment (inside bark) between OCC2 and OCC3 in OCC3 increment (Item 8). Record "Bored OCC2-3 increment" in Remarks. If OCC1 dbh is updated using a bored OCC1-2 radial increment, write "Bored OCC1-3 inc=..." in Remarks.

How to determine an increment by boring: The example is for the period between OCC2 and OCC3.

a.) Bore the tree just below breast height, on the side of the tree facing the point. If slope makes this impossible, bore the tree on the side opposite the point.

b.) Beginning at the outside (bark end) of the core, count 11 rings back to OCC2.

c.) Measure the length of this segment of the core to the nearest millimeter.

If diameter growth is greater than the edit range in the Husky, the Husky will generate an error message "DBH growth greater than maximum expected, accept or Yes or No correct". In those cases, check growth rate and Ch age by boring -- if not already bored at OCC3.

To use bored increment to revise or reconstruct a previous (OCC2) diameter...

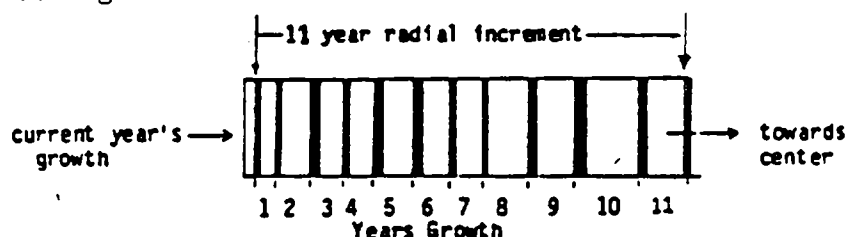
d.) Multiply the diameter increment from step c. by 1.1 to adjust for bark growth.

e.) To determine OCC2 dbh, subtract the answer in step d. from the measured OCC3 dbh.

If increment were required for the period between OCC1 and 2, one would count back 11 rings, mark the eleventh ring (occasion 2), count back an additional 12 or 13 rings, mark this second point (occasion 1) and measure the distance between the two marks. The following number of years apply in determining increment:

NUMBER OF YEARS FOR INCREMENT

Unit	OCC1 to OCC2	OCC2 to OCC3
Central Washington unit	13	11
Eastern Washington unit	12	11



9. Item 11--OCC 3 dbh (OC3 DBH). Information on diameter at breast height (dbh) is used in calculating volume, growth, and average stand diameter. It is also used in projecting mortality, cut, growth, and tree height.

On remeasured, lost, missing and new plots (SK 2, 4, and 7), measure the current diameter on trees with tree histories of 1, 2, 4, 6, and 9. The diameter for a seedling (<2.5 cm dbh) is recorded "0001". For snags (tree history 7) current diameter is required, but may be measured or estimated.

a.) Recording dbh. OCC3 diameter is recorded as a 4-digit code. For trees > 2.5 cm dbh, the diameter is recorded to the nearest millimeter. The diameter for seedlings (< 2.5 cm dbh) is recorded "0001".

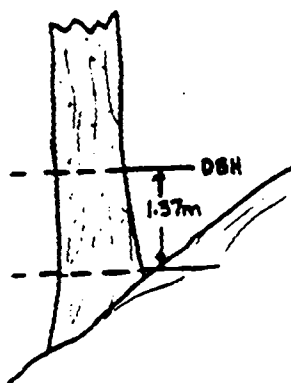
b.) Marking dbh. All live tally trees 7.5 cm dbh and larger on N and N/R points must be marked with an aluminum nail at the height on the bole where dbh is measured.

Trees tallied live and > 7.5 cm dbh at OCC2 were marked with a dbh nail. Mark this OCC2 point of measurement with a new nail regardless of how high or low the old nail is on the bole. Or, pull the old nail out far enough so it will not be overgrown within ten years. Note in remarks the height at which the diameter is measured if it is greater than 5 centimeters higher or lower than breast height (1.37 meters above the ground or the root collar on the uphill side of the tree). If the OCC2 nail cannot be found and the height at which OCC2 diameter was measured is unknown, follow the instructions in the next paragraph.

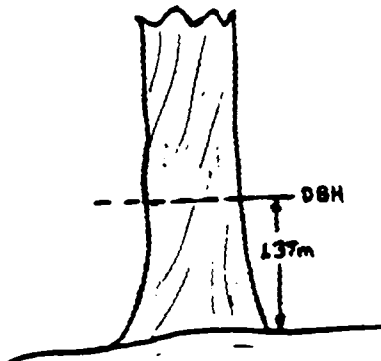
Mark trees ≥ 7.5 cm dbh tallied live for the first time at OCC3. Set an aluminum nail at breast-height 1.37 meters above the ground. On level ground, place the nail on the side of the tree facing the sample point. On a slope, place the nail on the uphill side of the bole. Leave as much of the nail exposed as possible, but be sure it is firmly affixed to the tree. If the tree is 75.0 cm dbh or larger, affix one additional dbh nail for every 30 cm of diameter, distributing the nails evenly around the circumference of the bole.

Avoid irregularities in the bole when placing the nail (see following figure). If the tree has swellings, bumps, depressions, or branches at breast-height, set the nail immediately above the irregularity, at a point where the stem has normal form. For trees sprouted from a stump, set the nail 1.37 meters above the point where the sprout leaves the stump. In remarks, note the distance from the ground to the nail if this distance is less than 1.32 meters or greater than 1.40 meters.

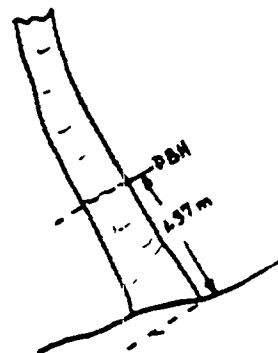
TREE ON SLOPE



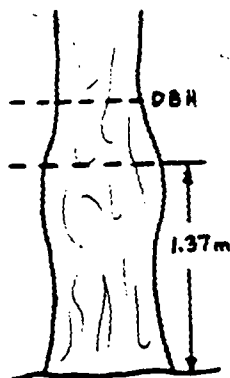
TREE ON LEVEL GROUND



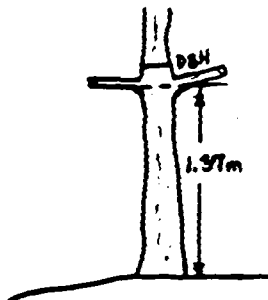
LEANING TREE



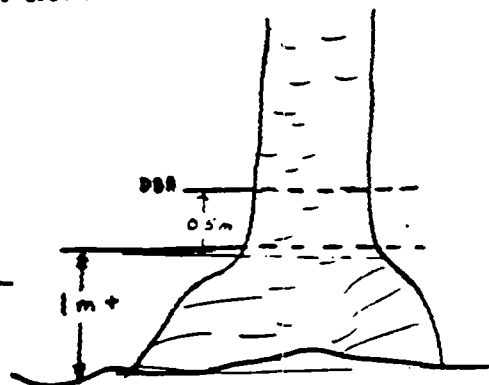
TREE WITH SWELL AT 1.37 m



TREE WITH BRANCH AT 1.37 m



BOTTLENECK TREE



c.) Measuring dbh. Measure dbh directly above the dbh nail. On trees without dbh nails (trees less than 7.5 cm dbh), measure dbh at a point 1.37 meters above ground level.

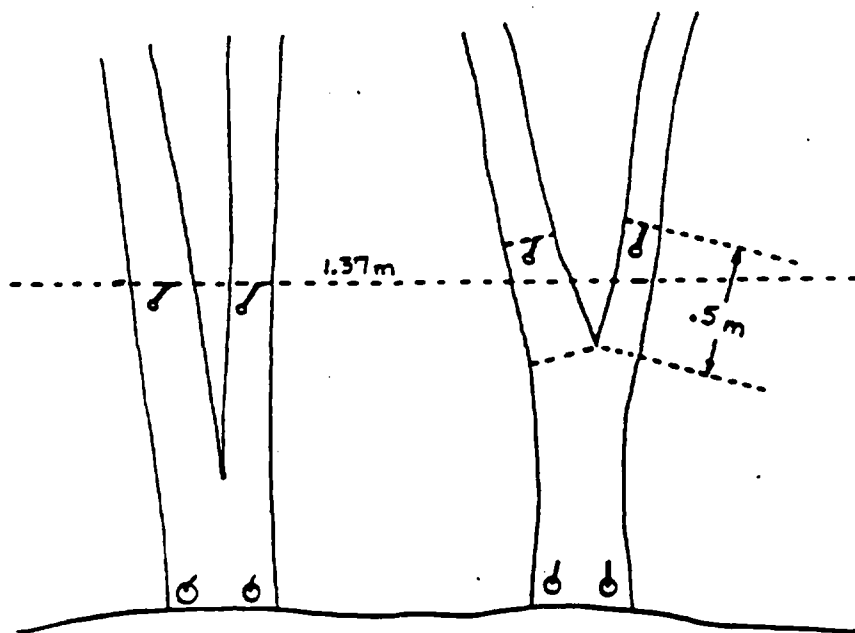
Before measuring dbh, remove any moss, poison oak or other vines, slugs, or anything else that may affect the diameter measurement. In addition, it may sometimes be necessary to remove a dead branch. Remove dead limbs only if the accuracy and efficiency of the measurement would be increased. Never remove live limbs!

d.) How to measure dbh under special circumstances.

(1) Forked trees. Tally remeasured trees the same way they were tallied previously; if a forked tree qualified at OCC2 as two tally tree, consider the tree forked and two tally trees at OCC3. Each fork that is 12.5 cm dbh or larger must be marked with a tree number tag on the side of the tree base where the fork occurs.

Crotch of fork at or above 1.37 m. Consider as a single tree. Measure diameter below the swell caused by the fork, but as close to 1.37 m as possible.

Crotch of fork below 1.37 m. Consider each fork as a separate tree. Measure diameter at 1.37 m above the ground or 0.5 m above the crotch of the fork, whichever point is higher on the tree. Forks are tallied with the prism if the fork is "in" where dbh is measured. Forks are tallied on the fixed-radius plots if the center of the tree at base is within the fixed-radius.





Measuring some dbh's can be a real bear.

(2) Diameter on trees that have grown together. When two tally trees have grown together at dbh, they may have the appearance of forked trees, but should be treated as separate trees.

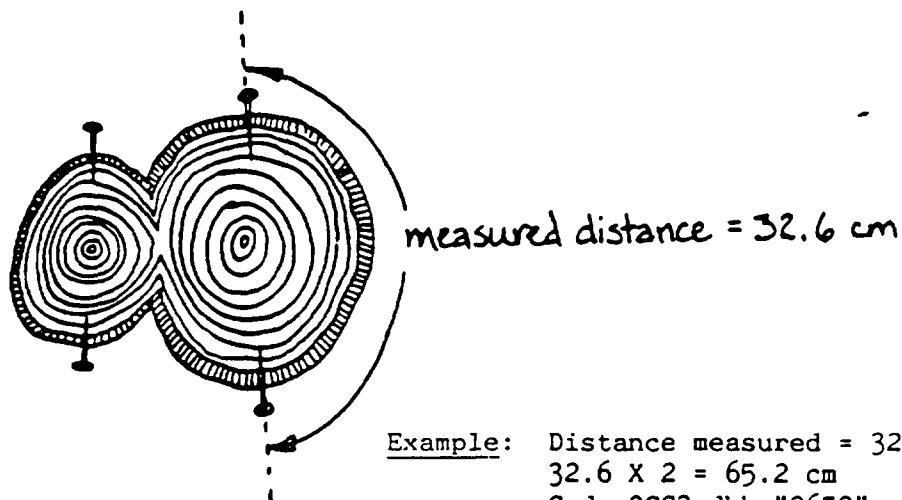
If the tree has a fully-measured diameter from a previous inventory, bore the tree for increment back to the time of full measurement. Fully-measured diameter means a diameter tape was extended completely around the tree to get the diameter measurement. Increment is bored--if possible--on the side of the tree facing the point. Bore at the height the previous diameter was taken.

Multiply the increment by two to get diameter increment since the measurement. Multiply the diameter increment by 1.1 to adjust for bark growth. Add the adjusted diameter increment to the previous measured diameter to get the current (OCC3) diameter. Record the current diameter. Then, divide the current diameter by two to determine a "half" diameter.

Use the half diameter to place two diameter nails on the tree. Set the first nail at the height the previous diameter was measured. Use a diameter tape to measure out the half-diameter distance from the first nail. Set the second nail at the end of the taped half-diameter distance. If the tree was last fully measured at OCC1, bore for increment between OCC2 and OCC3 and update the OCC2 dbh. Note "double nail dbh" in remarks.

If the tree is a new tally tree, set two diameter nails at dbh halfway around the tree's circumference from each other. Measure the distance between the nails with a diameter tape. Multiply the measurement by 2 and record the result as OCC3 diameter. Note "double nail diameter" in remarks.

If the tree is a remeasured tally tree with a "double nailed diameter" from a previous inventory, measure the half-diameter indicated by the two diameter nails. Multiply the half diameter by two. Record the result as OCC3 diameter. Note "double nail diameter" in remarks. If the tree is on a plot walked-thru at OCC2 (SK 7) and the tree was ≥ 12.5 cm dbh at OCC2, bore the tree for increment to recompute OCC2 dbh.



Example: Distance measured = 32.6 cm
 $32.6 \times 2 = 65.2$ cm
Code OCC3 dbh "0652"

(3) Impossible-to-measure trees. If it is physically impossible to measure the diameter of a tree with a diameter tape because of forking, huge root collars, etc., then estimate the diameter as follows.

a. Determine where dbh should be measured. Mark dbh with a diameter nail.

b. Using a prism as a guide, move to a point on the ground at which the tree becomes borderline.

c. Measure the horizontal distance from this point to the center of the tree. This is the tree's limiting distance.

d. Using the limiting distance table on page 144, look up the diameter for this limiting distance.

e. Record this diameter in Item 11 and note "prism estimated dbh" in the remarks column.

10. Item 12--OCC2 height (OC2 HT). A 3-digit code. OCC2 height is the total, normally formed height at OCC2 expressed to the nearest decimeter. OCC2 heights that were estimated, rather than measured, end in "0".

OCC2 heights are downloaded/printed for trees tallied live at OCC2 on which OCC2 height was estimated or measured in the field. Heights are not downloaded/printed for trees tallied live on the variable-radius plots walked-through at OCC2; for these trees, height was estimated by regression.

Do not change the printed/downloaded OCC2 code unless the OCC2 height is obviously in error. If judged erroneous, "cross out" the OCC2 height, but do not replace it with a new OCC2 height.

OCC2 height is not required--with one exception--for reconstructed tally on N points or for trees missed but "in" and live at OCC2 on N/R points. The exception: estimate actual height at the time of death for trees reconstructed as live at OCC2 but now dead (TH 5) or culturally-killed (TH 3) if current dbh is less than 12.5 cm dbh. (For these trees, current dbh is entered as OCC2 dbh).

11. Item 13--OCC 3 height (OC3 HT). 3-digit code indicating the tree's height to the nearest decimeter. On plots with sample kind 2, 4, or 7, apply the following instructions on N/R and N points:

a.) On each 2.1 meter fixed-radius plot, measure the actual height on ~~one~~ ^{The base} measured ^{agony} live tally tree ≥ 5 meters tall and less than 12.5 cm dbh. The measured height is not required if there are no live tally trees > 5 meters tall present on the 2.1 meter fixed-radius plot. Measure or estimate actual heights on all remaining trees tallied live on the 2.1-meter fixed-radius plot. Actual height is the height from the base of the tree to its tip.

c.) Measure heights on all normally formed trees live and ≥ 12.5 cm dbh on points 1 and 2. Continue measuring heights on normally-formed live conifer trees ≥ 12.5 cm dbh on points 3, 4 and 5 until 4 conifers ≥ 12.5 cm dbh on the plot have measured heights. Also continue measuring heights on normally-formed live hardwoods ≥ 12.5 cm dbh on points 3, 4, and 5 until 4 hardwoods ≥ 12.5 cm on the plot have measured heights.

If, after visiting all points, you have measured less than 4 normally-formed conifers and 4 normally formed hardwoods, return, in the order tallied, to live tally trees ≥ 12.5 cm dbh with missing tops or major forks--trees with poorly-formed heights. Measure actual heights, and then estimate the normally-formed height on these trees until 4 live conifers and 4 live hardwoods have measured or estimated normally-formed heights. For these poorly-formed trees, record the estimated normally-formed heights in OC3 HGT and the measured actual height in "remarks".

d.) Measure the height on the first live, normally-formed variable-radius tally tree ≥ 12.5 cm dbh of each species encountered on the plot.

e.) Measure heights on the live, normally-formed, variable-radius trees (> 12.5 cm dbh) with the largest and smallest OCC3 dbh's tallied on the plot.

f.) Measure or estimate heights on all snags (TH 7) "in" at OCC3.



On plots with light to moderate tally (< 16 prism tally trees), crews ~~are~~ encouraged ~~to~~ measure or estimate heights on all remaining live variable-radius tally trees for which a measured height is not required by instructions c.), d.) or e.)

If a live remeasured tree has an OCC3 height that is less than the printed/downloaded OCC2 height, make sure the OCC3 height is accurate. If it is, the Husky will note in the remarks column that you are aware of the discrepancy. Do not change the printed OCC2 height.

Codes for measured heights may not end in zero. Codes for estimated heights, including estimated heights of poorly-formed trees, must always end in zero. A tree with reconstructed (estimated) OCC3 tree height is coded with an "R" in the column right of OCC3 height (example: 410R)..

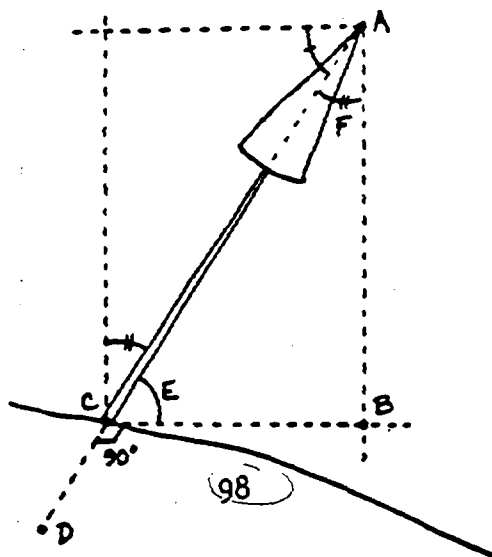
Use the following guidelines for measuring or estimating tree heights.

a.) Heights on normally-formed trees: Normally-formed height is the actual distance from the base of the tree (on the uphill side) to the tip of the tree. A normally-formed conifer has a central bole and no deformities (such as a crook, fork, or missing top). A normally-formed hardwood has a complete bole with no missing top. Some hardwood species (e.g. alder and cottonwood) typically have a single bole well up into the crown. Other species (e.g. oak, maple, ash, and madrone) typically fork much lower on the bole, conditions that represent normal form for these species.

b.) Heights on poorly-formed trees: Reconstruct total (normally-formed) tree height by estimating what the height would be were there no deformity in the main bole. Deformities include missing tops, and large crooks and forks above 1.37 meters. As a basis for estimating the normally-formed height, measure the tree's actual (poorly-formed) height and examine normally-formed trees of the same species and dbh in the same stand. Record the actual height in the "remarks" column. A tree with reconstructed OCC3 tree height is coded with an "R" in the column right of OCC3 height (example: 410R).

c.) Heights on leaning trees: Measure or estimate total bole length (from the base to the tip of the tree), not the elevation of the tip above the ground. To measure heights of leaning trees using a clinometer, follow these steps:

(1) Move to a point along a line (point D) that is perpendicular to the plane in which the tree is leaning.



(2) Using your clinometer, measure the height of point A above point B.

(3) By standing at the base of the tree and sighting up the bole with your clinometer, measure the slope of the bole in degrees (the left side of the clinometer scale). (Angle E in the diagram below)

(4) Subtract the degrees of lean (step c.) from 90 degrees. This gives you the degrees of angle F.

(5) By sighting through your clinometer, convert the angle calculated in step d. to a percentage.

(6) Use the slope correction table in Appendix 6 (page 143) to determine the expansion factor for the percent slope determined in step (5). Multiply the expansion factor by the measured distance from point A to point B (step 2.). This gives the length of the bole (point A to point C).

12. Item 14--Breast-height age (BH AGE). 3-digit code. Indicates the age at breast height. This variable is used in determining stand age, and in regression analyses for tree growth and mortality and stand harvest. On trees tallied live at OCC2, BH age is printed/downloaded and, if bored for age at OCC1 or 2, the age is followed by an asterik "***".

a.) For all new, live tally trees, bore or estimate the tree's breast-height age and record as a 3-digit code. The code indicates the tree's breast-height age to the nearest year. The ages of trees may be estimated, but bored ages are preferred.

b.) If on a new plot or point, bore live tally trees representative of the various species and sizes present on the plot. Estimate the age of the remaining trees using the bored ages as a guide. After boring the tree for age, leave the extracted increment core at the base of the tree (for the convenience of the check-plotter!).

c.) If a live, remeasured tally tree, examine and correct, as needed, the printed/downloaded breast-height age.

d.) If available, at least one live tally tree > 12.4 cm dbh not previously bored on each point should be bored for age when the crew visits the plot in 1991. Trees bored should sample age across the range of species, tree size and age classes present on the plot.

e.) A special case: Bore for breast-height age, any conifer with a tree history of 1, 2 or 6 and an OCC3 dbh > 12.4 cm that was less than 2.5 cm dbh at OCC2. The breast height age on these trees should not exceed 13 years.

f.) If you bore the tree for a breast-height age, record "Bored Age" in remarks (the husky will add an asterisk "***"). Do not change the printed/downloaded age of remeasured trees that have died or have been cut since OCC2; age will be backdated in the office by computer.

If a reconstructed ~~live~~ tree with TH 3, 5 or 8 on an N point, record current age.



If you can determine breast-height age accurately by counting branch whorls on ponderosa pine, western white pine, noble fir and grand fir that are ≤12.5 cm dbh and on Douglas-fir seedlings, record the age as a "Bored Age."

g.) For trees whose age was estimated previously, the printed age was calculated by:

- (1) Taking the midpoint of the tree's age group. (The OCC2 age groups were 10-year classes up to age 200, 200-300 years, and 300+ years. Age at OCC2 was total tree age).
- (2) Subtracting the standard number of years the species requires to reach breast height.
- (3) Adding the number of years since the previous inventory (OCC2).

c. Determining breast-height age of large trees. To determine the age of a tree whose radius is greater than the length of the increment borer, use the following procedure:

- (1) Bore into the tree as far as possible, extract the core, and count the rings.
- (2) Count the number of rings in the inner 5 cm of the core.
- (3) While the increment borer is still in the tree, measure the length of the borer that is exposed.
- (4) Subtract this length (3) from the total length of the increment borer.
- (5) Divide the tree's dbh by 2.
- (6) Subtract (4) from (5). This gives you the distance by which you are short of reaching tree center.
- (7) Divide this number (6) by 5. This tells you how many 5-cm lengths you were short by.
- (8) Multiply this number (7) by the number of rings in inner 5 cm (2).
- (9) Add this number (8) to the total number of rings in the extracted core (1). This is the tree's estimated breast-high age.
- (10) Note "extrapolated age" in the remarks column.

Example: Determine the age of a 148.8-cm Douglas-fir. The core has 110 rings, and has 10 rings in the inner 5 cm. 2 cm of the 41-cm-long increment borer did not penetrate the tree. Each number below is associated with its corresponding step above:

- | | |
|----------------------|--|
| 1.) 110 | 6.) $74.4 - 39 = 35.4$ |
| 2.) 10 | 7.) $35.4/5 = 7.1$ |
| 3.) 2 | 8.) $7.1 \times 10 = 71$ |
| 4.) $41 - 2 = 39$ | 9.) $110 + 71 = 181$ years breast-high |
| 5.) $148.8/2 = 74.4$ | |

13. Item 15--OCC2 crown ratio (C). 1-digit code printed/downloaded by computer for all live trees tallied at OCC2. The codes are the same codes used for OCC3 crown ratio (Item 16). Change the printed/downloaded code only if it is obviously incorrect. Note: The Husky will alert you if the OCC3 crown ratio differs by 2 or more classes from the OCC2 crown ratio and will ask if a change is desired. *Estimate OCC2 crown ratio for reconstructed tally generated prior to OCC2.*

14. Item 16--OCC3 crown ratio (R). Record a 1-digit code for all live trees tallied. Compare estimate with the OCC2 code for reasonableness and continuity.

Code Percent live crown

1	1-10
2	11-20
3	21-30
4	31-40
5	41-50
6	51-60
7	61-70
8	71-80
9	81+

Crown ratio is the percent of the tree's total height that supports living crown. The tree's total height includes dead, broken, or missing portions of the tree. For trees of uneven crown length, ocularly transfer lower branches on the fuller side to fill holes on the sparse side until a full, even crown is created. Base your estimate on this "created" crown.

Crown ratio is one indicator of a tree's vigor. In data analysis, trees with a crown ratio of 30-percent or less are considered less vigorous. For this reason, be particularly careful when deciding between codes "3" and "4." You may want to use your clinometer to measure live crown ratios on these trees.

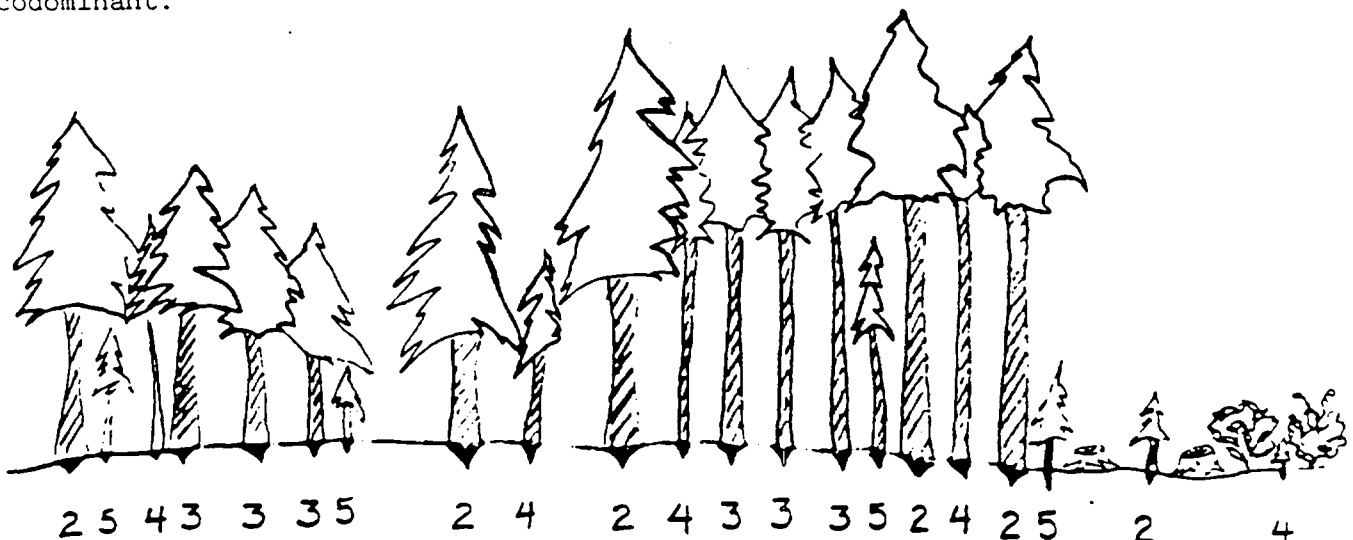
15. Item 17--OCC2 crown class (C). 1-digit code, printed/downloaded by computer for all trees tallied at OCC2. The codes are the same codes used for OCC3 crown class (Item 18). Change the printed/downloaded code only if it is obviously incorrect. *Estimate OCC2 crown class for reconstructed tally generated prior to OCC2.*

16. Item 18--OCC3 crown class (C). Record a 1-digit code for all live trees tallied. Be sure to compare your estimate with the OCC2 code for reasonableness and continuity. Crown class describes the tree's position in the stand; it indicates how well the tree is competing for light. This variable identifies trees that are "free-to-grow," and is used in growth projections. Crown classes are described and coded as follows:

<u>Code</u>	<u>Crown class</u>	<u>Description</u>
2	Dominant	Crown extends above the general level of the canopy; it receives full light from above and some direct light from the sides. This class includes open-grown trees.
3	Codominant	Crown is part of the general level of the canopy; it receives full light from above but little light from the sides. Crown is usually medium-sized and somewhat crowded by other trees.
4	Intermediate	Tree is shorter than dominants or codominants; crown is below or barely reaches into the main canopy formed by dominant and codominant trees. Crown receives little direct light from above and none from the sides. Crown is usually small and quite crowded against other crowns.
5	Overtopped	Crown is entirely below the general level of the canopy; it receives no direct light from above or from the sides.

These codes are easily applied in even-aged stands. Classification is more difficult in uneven-aged stands or in areas where more than one stand is present. In these situations, classify the tree based on its immediate environment. In other words, base your classification on how much light the tree's crown is receiving. The intermediate and overtopped crown classes are meant to include trees seriously affected by direct competition with adjacent trees.

For example, a young, vigorous tree that is considerably shorter than other trees in the stand--but that is not overtopped by other trees and that receives full light from above and partly from the side--is classified as dominant. The same principle applies to two-storied stands: understory trees should only be assigned subordinate crown classes if they are adjacent to--and shaded by--overtopping trees. In areas with scattered residual overstory trees over younger trees, a considerable proportion of the understory trees are dominant or codominant.



Crown class illustration using codes

17. Item 19--Growth impactor. Record a 2-digit code for all live trees tallied.

If a damage code was recorded by the field crew at OCC2, the code has been converted to the appropriate OCC3 growth impactor code and printed in this item. If the tree is now dead or cut, do not change the printed/downloaded code. If the tree is still alive, change or delete the printed/downloaded code in accordance with the current coding rules.

If the tree was a snag tallied at OCC2, the OCC2 code (92-95) will be printed/downloaded. Do not change the code; see page 118.

Code this item other than "00" only when the tree meets the criterion for the particular factor being considered. Codes and explanations follow.

<u>Code</u>	<u>Growth Impactor</u>
00	None
11	Bark beetles
12	Defoliators
13	Balsam woolley aphid
14	Terminal feeders
15	Spruce budworm
21	Laminated root rot
22	Armillaria root rot
23	Blackstain root disease
24	Annosus root disease
26	Dwarf mistletoe (<i>conifers only</i>)
27	Other diseases and rot
30	Fire
40	Animal
50	Weather
60	Suppression
70	Excessively deformed sapling (<i>not a valid death code</i>)
72	Dead top, spike top, top out (<i>not a valid death code</i>)
80	Damage due to human activity (<i>not a valid death code</i>)
90	Other natural damage

For trees ≥ 12.5 cm dbh that do not have a minimum log present, code cull other "99"; see cull other on page 110.

A Guide for identifying and coding growth impactors.

Code Growth impactor

- 11 Bark beetles. Code when serious damage characteristics are present on Douglas-fir, ponderosa pine or lodgepole pine.

Serious damage characteristics:

On Douglas-fir: needles turning yellow or red over most of tree (tree is dying); conspicuous boring dust in bark crevices; black pitch streaks in bark over much of bole. Ignore small amounts of clear or white pitch on the bole of the tree.

On pines: needles turning yellow to red over most of tree; small yellow to red pitch tubes (< 1 cm dia.) along bole; reddish boring dust in bark flakes and crevices, or around base of tree; gallery patterns under bark. Ignore copious excretion of yellowish to clear pitch.

Ips beetles on ponderosa pine: tops dead in immature trees; small areas of dense stands of dead saplings in which all trees are dead. Ignore mature trees with the top few feet of crowns fading or dead.

- 12 Defoliators. Code when serious damage characteristics are present on a tree.

Serious damage characteristics: Entire crown more than 25-percent defoliated. Top third of crown more than 50-percent defoliated or discolored. Leader deformed or killed. Current foliage with more than 25 percent of tips discolored or more than 25 percent of needles missing. Many branches with no new shoot growth. On hemlock and grand fir: code for any sign of defoliators.

- 13 Balsam woolly aphid. Code when damage characteristics or signs of aphids are present on true firs.

Damage characteristics:

On subalpine fir: Trees dying from the top downward with needles turning bright red; woolly material or dirty-white encrustations on the bark of the main bole.

On Pacific silver fir: Foliage thin and fading on individual branches fading throughout the crown; branch gouts: knob-like swelling on twig tips.

On grand fir: Flattened, thinning umbrella-shaped top; thinning and dieback of the crown from the top downward; new foliage growth reduced; internodal branches dead and dying; severe pitching on the main bole.

- 14 Terminal feeders. Code when damage characteristics are present on ponderosa and lodgepole pines 1 to 6 meters tall.

Damage characteristics: Current terminal leader or tip may be curled or dead; shorter terminal (both total length as well as needle length) than lateral branches at first whorl; one or more side branches has assumed dominance.

- 15 Spruce budworm. Code when serious damage characteristics are present on Douglas-fir or true firs. Serious damage characteristics are the same listed for defoliators.
- 21 Laminated root rot. Code when Phellinus weirii is present in the tree. Most common in true fir, Douglas-fir, and hemlock.
- 22 Armillaria root rot. Code when Armillaria (mellea) ostoyae is present in the tree. Conifers and hardwoods are susceptible.
- 23 Black stain root disease. Code when Ceratocystis (Verticicladiella) wagnerii is present in the tree. Most common in Douglas-fir; occasional in hemlock and pine.
- 24 Annosus root disease. Code when Fomes (Heterobasidion) annosus is present in the tree. Most common in true fir and pine.
- 26 Dwarf mistletoe. Code if dwarf mistletoe (Arceuthobium spp) is the most important growth impactor and will kill the tree within 10 years, or has killed the tree. *This is conifer mistletoe. Do not code for hardwood.*
- 27 Other diseases and rot. Code when any disease not previously listed will kill the trees within 10 years. May include: cankers; conks on tree or on ground near tree (e.g. Phaeolus schweinitzii, Phellinus pini); wilts; dry rot associated with sunscalds and mechanical damage; scabs and leaf galls; diebacks; white pine blister rust. Note the kind of disease in remarks.
- 30 Fire. Code when damage to the tree from fire will kill the tree within 10 years. Ignore basal scars unless they have girdled enough of the cambium to kill the tree. If foliage has been killed by fire, do not code fire damage unless foliage in the upper one-third of the crown has been killed.
- 40 Animal. Code when damage caused by animals will kill the tree within 10 years. Also code "40" for trees less than 12.5 cm dbh that are heavily browsed.
- 50 Weather. Code when damage caused by weather will kill the tree within 10 years. Examples of when to code: most of crown has been lost due to wind or snowbreak; bole has been shattered by lightning; tree has been partially uprooted by wind (and tree does not have root rot).

- 60 Suppression. Code when overtopping by other trees will kill the tree within 10 years, or prevent a sapling from attaining 12.5 cm dbh. Suppressed understory trees are common in old-growth stands. They may also occur in second-growth timber, or as residual trees after logging. Suppressed trees are usually characterized by extremely short or nonexistent internodes; twisted, gnarled stems; short, flat crowns that form an "umbrella"; or extremely sparse foliage.
- 70 Excessively deformed sapling. Code for trees 2.5-12.4 cm dbh that will never produce a minimum log. A minimum log is 2.5 m for hardwoods and 3.8 m for conifers. *Not a valid death code.*
- 72 Dead top, spike top, top out. Code if 1 or more meters of the top is dead or gone. *Not a valid death code.*
- 80 Damage due to human activity. Code if any damaging agent will kill the tree within 10 years. Examples of damage or death due to human activity include scarring due to logging operations, exposure to herbicides, strangulation by fencing, and vandalism. *Not a valid death code.*
- 90 Other natural damage. Code if any damaging agent not listed above will kill the tree within 10 years. These may include natural mechanical injuries and damage or death due to an unidentifiable cause. Note the kind of damage in remarks.

18. Item 20--Cause of death/Type of harvest/Use or circumstance of disappearance

a.) For mortality trees (TH 5): Record a 2-digit code for trees tallied or reconstructed as alive and 2.5 cm dbh or larger at OCC2 that are now dead on N/R and N points. For these dead trees, "item 3--tree history", is coded "5".

Use the same codes as for growth impact factor (Item 18), excluding codes 70 and 72. Data from this item explains the causes of tree mortality in the inventory unit. If the tree is entered as a snag on a separate line, refer to Use or Circumstances of disappearance--(See instruction 18, c. on the next page and see page 118)

b.) For harvested trees (TH 8): Record a 2-digit in Item 20 for trees tallied or reconstructed as live and > 12.5 cm dbh at OCC2 that are now harvested on N/R and N points.

Code Harvest Class

01	Harvested for industrial supply
02	Harvested for firewood or local use
03	Harvested for incidental reasons

Definitions:

Harvested for industrial supply means the tree was harvested for industrial roundwood or chips. The tree was not used for firewood or for products manufactured and used by "do-it-yourselfers", often on the property of origin for improvements such as fences, buildings and bridges. The tree was marketed and transported from the property of origin to wood-using plant or export operation.

Harvested for firewood or local use means the tree was harvested for firewood, or for wood products manufactured and used locally by "do-it-yourselfers", often on the ownership of origin, for improvements such as fences, buildings and bridges. The tree was not marketed and transported to a wood-processing plant or export operation.

Harvested for incidental reasons means the tree was harvested (1) as an isolated removal in an otherwise undisturbed stand or (2) as part of a harvest activity in an adjacent stand condition that resulted in the removal of one or more tally trees. If the adjacent harvest activity was a clearcut harvest that removed one or more trees tallied as live and > 12.5 cm dbh at OCC2 on an N/R or N point, substitute the point, and do not code for this adjacent clearcut harvest.

c.) For snags (TH 7): 1-digit code required for all snags. Code for use or circumstance of disappearance. If a snag tallied at OCC2 is present, this item indicates use by wildlife. Code "01" if a cavity or den is present, or "00" if there is no cavity or den. If a snag tallied at OCC2 is now "gone", this item indicates the "circumstances of disappearance" of the snag. Codes and definitions are as follows:

Code OCC 3 Use or Circumstance of disappearance

00	TH 7; no cavity or den present.	
01	TH 7; cavity or den present.	<u>SNAG PRESENT</u>

02	TH 7; fell over "naturally" (wind, decay, etc.); still on ground.	
----	---	--

03	TH 7; fell over "naturally;" removed from site.	
----	---	--

04	TH 7; cut down and left on site.	<u>SNAG "GONE"</u>
----	----------------------------------	--------------------

05	TH 7; cut down and removed.	
----	-----------------------------	--

06	TH 7; dbh and/or height no longer meet minimum for tally (snag "shrank" to less than 2 meters tall and/or 22.5 cm dbh).	
----	---	--

19. Item 21--Dwarf mistletoe (M). 1-digit code required for all live tally conifers. The code indicates the degree of infection of dwarf mistletoe. This item is used in describing the extent and severity of mistletoe infection in the sample area.

This item is printed/downloaded for all conifers tallied as alive at OCC2. If the tree is alive at OCC3, change the printed/downloaded code if it is inaccurate. If the tree is now dead, do not change the printed/downloaded code. Code as follows:

Trees 2.5 - 7.4 cm dbh

Code Description

0	No mistletoe infection.
1	Mistletoe infection in either the upper or lower half of crown, but not in both. No brooms.
2	Mistletoe infection in both the upper and lower halves of crown, or with one or more brooms anywhere in the crown.

Trees 7.5 cm dbh and larger

"Score" the mistletoe code as follows:

- a.) Visually divide the live crown into thirds.
- b.) Score infections in each third as follows:

<u>Score</u>	<u>Description</u> (A bole infection counts as a branch infection.)
0	No infection.
1	Less than 50-percent of the branches infected; no brooms.
2	50-percent or more of branches infected; or one or more brooms.

- c.) Sum the scores for each third. Code the total.

Example: A tree has no infection in top third of the crown, light infection in the middle third, and has two brooms in the lower third.

The total score is: $0 + 1 + 2 = 3$; the code is: "3".

20. Item 22--Hardwood clump (CL). Record a 1-digit code for all tallied hardwoods other than snags. The code indicates whether the tree is in a clump. A clump is defined as 3 or more hardwood stems originating from a root system from a tree now gone; hardwood clumps typically arise from old stumps that are left from cutting or from natural mortality.

<u>Code</u>	<u>Description</u>
0	The hardwood is not in a clump.
1	The hardwood is in a clump.

Each fork of a forked tree counts as one stem and must be entered on a separate line. Clump data are used in adjusting stocking estimates; trees growing in clumps contribute less stocking than those growing as individuals.

21. Item 23--Cull other. Record a 2-digit code for all live trees > 12.5 cm dbh and for trees > 12.5 cm at OCC2 that are now dead, cut, or culturally-killed (TH 3,5,8). This item indicates the percent of volume--to the nearest 10-percent--of the volume lost due to broken or missing parts, forks, or crooks. Code only when 1 meter or more of the tree is defective. Cull for hardwood forking only if the forking is not typical of the growth form for the species. Information on cull other is used in calculating net tree volume.

If the conifer does not have a minimum log (3.8 m), code this item "99."

If the hardwood does not have a minimum log (2.5 m), code this item "99."

Remeasured trees. For conifers tallied as alive and > 12.5 cm dbh at OCC2, this item has been printed/downloaded by computer. Use the printed code only as a guide. Determine percent cull according to the current rules, and correct the printed/downloaded codes if obviously in error. For trees that are now dead or cut, cull other indicates the cull at the time of the OCC2 inventory.

Use the following guide and tables showing merchantability standards and the percentage distribution of volume by log, to determine the percent of cull other.

Note the cause of volume losses in the remarks column.

a.) Top out. Cull one meter below the break for splintering, plus the entire top above the break.

b.) Fork. When the crotch of the fork is below 1.37 meter, treat as separate trees with no cull.

When the crotch of the fork is above 1.37 meter, cull only if additional volume in a second stem does not compensate for the volume reduction in the main stem. Forked trees often have as much or more volume than trees without forks.

Merchantability Standards

	Size class (cm)	Stump height (cm)	Log length (m)	Minimum top diameter outside bark (cm)

SAWTIMBER:				
Conifer	22.5+	45	5.0	18
Hardwood	27.5+	45	2.5	23

POLETIMBER:				
Conifer	12.5-22.4	30	2.5	10
Hardwood	12.5-27.4	30	2.5	10

Percentage distribution of total tree volume
for sawtimber conifers (22.5 cm dbh and larger)

(5-meter logs)

Tree height (in logs)	Log number											
	1	2	3	4	5	6	7	8	9	10	11	12
1	100											
2	70	30										
3	55	35	10									
4	41	31	20	8								
5	32	27	21	14	6							
6	27	23	19	15	11	5						
7	23	20	17	15	12	8	5					
8	20	18	16	14	12	9	7	4				
9	17	16	15	13	11	10	8	6	4			
10	16	15	13	12	11	10	8	7	5	3		
11	14	13	13	11	11	10	8	7	6	4	3	
12	14	13	12	11	10	10	8	7	6	4	3	2

Percentage distribution of total tree volume
for hardwoods and poletimber conifers (conifers 12.5-22.4 cm dbh)

(2.5 m logs)

Tree height (in logs)	Log number									
	1	2	3	4	5	6	7	8	9	10
1	100									
2	55	45								
3	41	33	25							
4	33	28	22	17						
5	28	24	20	16	12					
6	25	22	18	15	12	8				
7	22	20	17	14	12	9	6			
8	20	18	16	14	11	9	7	5		
9	18	17	15	13	11	9	7	6	4	
10	17	16	14	12	10	9	8	6	5	3

22. Item 24--Cull rot category (CR). Record a 1-digit code for all tally trees ≥ 12.5 cm dbh except snags and reference trees (TH 7 and 9). Cull rot is printed/downloaded for remeasurement trees. The code indicates the broad decay category of the tree, as described below.

<u>CODE</u>	<u>CULL ROT CATEGORY</u>
0	0 to 9 percent
1	10 to 75 percent and one or more of the following is true: (a) The first log is 100-percent rotten. (b) Rotten scar $\geq 1/3$ of tree length is present. (c) E.T. or Quinine conk is present. (d) P. pini conk is present and tree is ≥ 140 years old.
2	10 to 75 percent and none of the conditions (a thru d) listed for code 1 are true.
3	> 75 percent.

Information on cull rot is used with information on cull other (Item 23) to calculate the net volume of trees.

23. Item 25--OCC 3 decay class (DC). Record a 1-digit code for all snags, indicating the snag's stage of decay. Use the figure and table on pages 119 and 120 as guides.

VIII. SNAG TALLY

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IX. SNAG TALLY

A. Objectives. Snags are an important special habitat feature for many species of wildlife. Snag data collected in eastern Washington will be used in:

1. Evaluating current forest conditions--How do snag populations vary as a function of plant community, successional stage, and disturbance history? How well do current snag conditions meet the needs of snag-dependent wildlife?

2. Studying how snags change over time--How fast are snags being recruited? What kind of trees are being recruited (species, age, growth impactors, cull, size, etc.)? How fast do standing dead trees decay? At what rate do they disappear, and what causes their disappearance (natural decay processes, firewood use, etc.)?

B. When to collect snag data. Collect data on all 5-point plots (sample kinds 2, 4, and 7).

C. Tree selection--40 BAF prism tally.

1. On N/R points: (1) account for all snags tallied at OCC2; and (2) tally any trackable trees from the OCC2 inventory that have since died (TH 3 or 5) and that are now at least 22.5 cm dbh and 2.0 m tall.

2. On N points: tally snags using the following selection rules (same as OCC2):

a.) Tally snags include all standing dead trees that are leaning less than 45 degrees from vertical. They may be either (1) self-supporting, by the tree's root system, or (2) supported by another tree or other object ("leaning"). Snags include stumps of harvested trees that meet the tree selection criteria.

b.) Tally snags must be at least 22.5 cm in dbh and at least 2 m tall at OCC3, and must be "in" with a 40 BAF prism. (As part of "reconstruction," individual data items will indicate whether you believe the snag was a snag or a live tree at the time of the OCC2 inventory.)

c.) As part of "reconstruction," also record a line for trees that would've been tallied snags at OCC2 but are now "gone" (shrank or fell over).

Data recording. Record one line for each snag tallied, completing data items as indicated in the tally guide below. For remeasured snags, the OCC2 data are already printed/downloaded.

D. Tree identification and measurement.

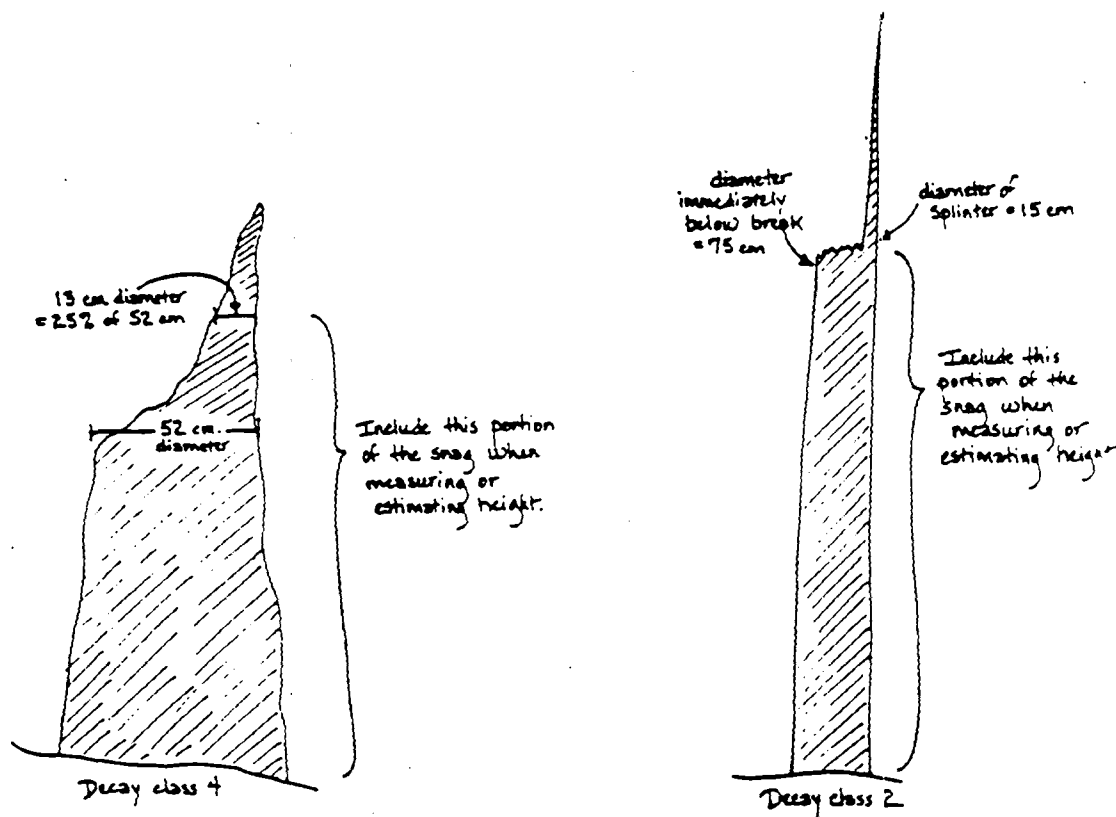
1. Item 1--Line number (LINE). 5-digit code printed/downloaded for OCC2 tally snags. For new snags that were live tally trees at OCC2, enter the same line number used for the corresponding TH 3 or 5. For new snags (snag not tallied at OCC2), use a line number in the new tally series.
2. Item 2--Point number (PT). Record a 2-digit code for all snags, using the same codes as for trackable trees.
3. Item 3--Tree history (TH). Record a 1-digit code for all snags. The tree history will be 7 for all snags currently present on the plot and snags that were tallied at OCC2 but are now "gone".
4. Item 4--Species (SPC). Record a 3-digit code for all snags, using the same codes as for trackable trees (see Item 4, page 87). Even if species identification is difficult or uncertain due to decay, make an "educated guess" if possible. In particular, it is important to distinguish hardwoods from conifers. The snag's bark (either attached or sloughed and laying beside the snag) and the branching pattern (if branches are still present) may provide clues to its species. If you absolutely cannot identify the species of a snag, record "999" (species unknown). Snags tallied at OCC2 will have a species printed/downloaded. If incorrect, update.
5. Item 5--Azimuth (AZ). Record a 3-digit code for all snags, using the same codes as for trackable trees (see Item 5, page 88). Update OCC2 entries if incorrect.
6. Item 6--Distance (DIST) (CM). Record a 4-digit code for all snags, using the same codes as for trackable trees (see Item 6, page 88). Update OCC2 entries if incorrect.
7. Item 10--OCC2 dbh (OC2 DBH) (MM). Printed/downloaded as a 4-digit code for snags tallied at OCC2. Update, if necessary, to insure that the OCC2 dbh is never smaller than the OCC3 dbh.
8. Item 11--OCC3 dbh (OC3 DBH) (MM). Record a 4-digit code for all snags (except "gone" snags with a disappearance code of 2-6), indicating the snag's current dbh to the nearest millimeter. Snag dbhs may be estimated or measured. Measure or estimate dbh at a point 1.37 m above ground level, as for live trees. The recorded dbh indicates the diameter of **existing material**. Do not adjust the diameter for missing bark or chunks of wood.

Unlike living trees, snags can shrink (not grow) in dbh over time!. If the OCC3 dbh is larger than the OCC2 dbh, double check (i.e. measure) the snag's current dbh--then record the measurement. If the OCC2 dbh is smaller, correct it to read the same as the OCC3 dbh. These situations may be attributed to the fact that OCC2 snag diameters were often estimated.

9. Item 12--OCC2 height (OC2 HT) (DM). A 3-digit code is printed/downloaded for snags tallied at OCC2. Update, if necessary, to insure that the OCC2 height is never shorter than the OCC3 height.

10. Item 13--OCC3 height (OC3 HT) (DM). Record a 3-digit code for all snags indicating the snag's height to the nearest decimeter. Snag height may be estimated or measured, and should reflect the snag's actual height (the distance from ground level to the present top of the snag). Do not reconstruct for missing parts. This item not needed for "gone" snags.

Snags frequently have broken, irregular tops. When measuring height on such trees, use the "25-percent rule" to determine the point on the bole to which height should be measured. Include in your height estimate portions of splintered tops (usually on decay class 1 or 2 trees) that have a diameter that is at least 25-percent of the diameter of the "entire bole" immediately below the broken portion (see figure below).



Unlike living trees, snags can shrink (not grow) in height over time! If the OCC3 height is greater than the OCC2 height, double check (i.e. measure) the snag's current height, and record the measurement. Change the OCC2 height, so that it is not shorter than the OCC3 height. These situations may be attributed to the fact that OCC2 snag heights were often estimated.

11--Item 19--OCC2 Damage/Death (GI). Printed/downloaded as a 2-digit code for all snags tallied at OCC 2. The growth impactor code (called "damage/death" at OCC2) indicated both decay class and use by wildlife as follows (do not change the printed/downloaded code):

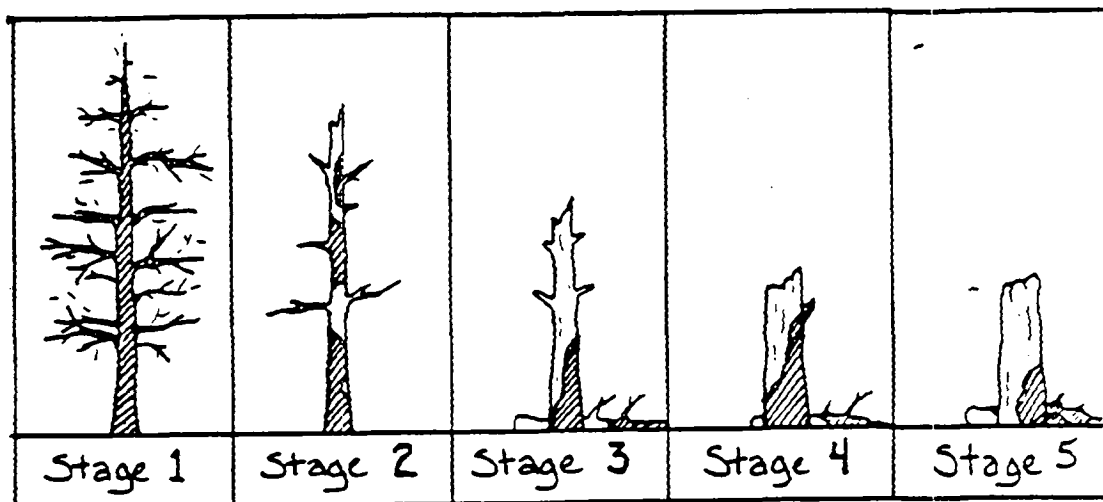
<u>OCC2 damage/ death code</u>	<u>Broad decay class and use</u>
92	Hard snag with cavity or den.
93	Hard snag without apparent use.
94	Soft snag with cavity or den.
95	Soft snag without apparent use.

12. Item 20--Use or Circumstance of disappearance (D/U). Record a 2-digit code for all snags. If a snag tallied at OCC2 is present, this item indicates use by wildlife. Code "01" if a cavity or den is present, or "00" if there is no cavity or den. If a snag tallied at OCC2 is now "gone", this item indicates the "circumstances of disappearance" of the snag. Codes and definitions are as follows:

<u>Code</u>	<u>OCC3 Use or Circumstance of disappearance</u>	
00	TH 7; no cavity or den present.	<u>SNAG PRESENT</u>
01	TH 7; cavity or den present.	
02	TH 7; fell over "naturally" (wind, decay, etc.); still on ground.	
03	TH 7; fell over "naturally;" removed from site.	
04	TH 7; cut down and left on site.	<u>SNAG "GONE"</u>
05	TH 7; cut down and removed.	
06	TH 7; dbh and/or height no longer meet minimum for tally (snag "shrank" to less than 2 meters tall and/or 22.5 cm dbh).	

14. Item 25--OCC3 decay class (DC). Record a 1-digit code for all snags, indicating the snag's stage of decay. We are applying the same decay class system to snags and coarse woody debris. It is unlikely that decay class 5 will apply to snags; by the time a snag has reached decay class 5, it will have toppled over or have become less than 2 meters tall.

Use the figure (below) and table (next page) as guides.



Characteristics of Douglas-fir snags by decay class ¹

Snag Characteristics

<u>Decay stage (code)</u>	<u>Limbs and branches</u>	<u>Top</u>	<u>% Bark Remaining</u>	<u>Sapwood presence</u>	<u>Sapwood condition</u>	<u>Heartwood condition</u>
1	All present	Pointed	100	Intact	Sound, incipient decay, hard, original color	Sound, hard, original color
2	Few limbs, no fine branches	Broken	Variable	Sloughing	Advanced decay, fibrous, firm to soft, light brown	Sound at base, incipient decay in outer edge of upper bole, hard, light to reddish brown
3	Limb stubs only	Broken	Variable	Sloughing	Fibrous, soft, light to reddish brown	Incipient decay at base, advanced decay throughout upper bole, fibrous, hard to firm, reddish brown
4	Few or no stubs	Broken	Variable	Sloughing	Cubical, soft, reddish to dark brown	Advanced decay at base, sloughing from upper bole, fibrous to cubical, soft, dark reddish brown
5	None	Broken	Less than 20	Gone	Gone	Sloughing, cubical, soft, dark brown, OR fibrous, very soft, dark reddish brown, encased in hardened shell

¹ Characteristics are for Douglas-fir. Snags of other species may vary somewhat; use this table as a guide.

IX. COURSE WOODY DEBRIS

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IX. COURSE WOODY DEBRIS

A. Introduction. Course woody debris (CWD) is dead, downed pieces of wood. In the eastern Washington inventory, we are sampling pieces of CWD that are at least 1 meter in length and at least 12.5 cm in diameter at the small-end. CWD, like live trees, shrubs, herbs, snags and stumps, is a component of a forest's structural diversity and biomass. In recent years, CWD has received increasing attention from wildlife biologists, mycologists, ecologists, and others interested in forest relationships. These researchers are interested in CWD because it relates to:

1. wildlife habitats,
2. forest diversity,
3. storage and cycling of nutrients and water, and
4. carbon sequestration, which relates to atmospheric conditions.

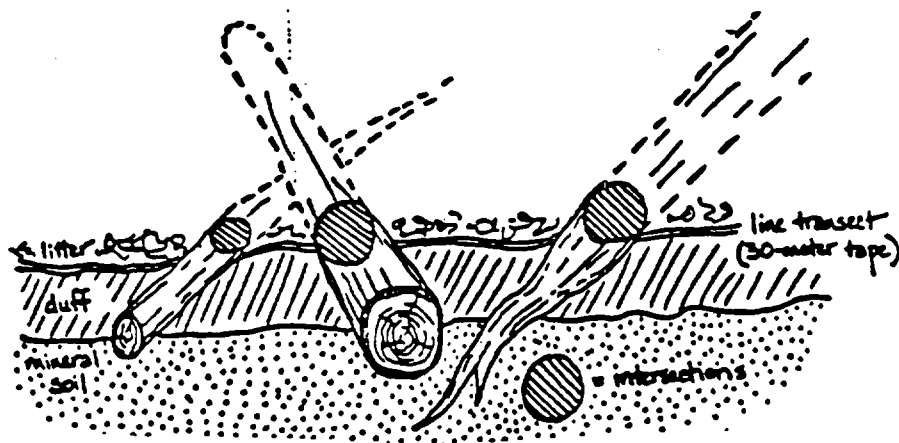
Knowledge about the structure and function of CWD debris is incomplete. Most studies have been conducted in mature and old-growth forests that originated naturally after wildfire. Little is known about the characteristics of woody debris in managed stands and in stands that originated after logging--stands which increasingly predominate within the forest lands that FIA inventories in the Pacific Coast states. Data on CWD collected on field plots in eastern Washington will be used to address these information needs.

B. Definition. In this inventory, CWD includes dead tree boles, limbs, and other woody pieces that have been severed from their original source of growth or uprooted. CWD includes uprooted tree and shrub boles and any stems or branches attached to them. CWD may be scattered across the site or piled. CWD does not include:

1. Standing trees, stumps, or shrubs.
2. Dead foliage, bark, or other non-woody pieces that are not an integral part of a bole or limb. (Bark attached to a portion of a piece is an integral part).
3. Roots or main bole below the root collar.

C. When to collect data on course woody debris. Collect data on CWD on each point of all 5-point forest plots visited in 1991. The ten plots visited in Klickitat County in late 1990 will be revisited during the 1991 field season to sample CWD. Plots visited in late 1990 in Asotin, Columbia, Garfield, Walla Walla and Whitman Counties will not be revisited; i.e., in these southeast Washington counties, we are not sampling CWD in the current inventory.

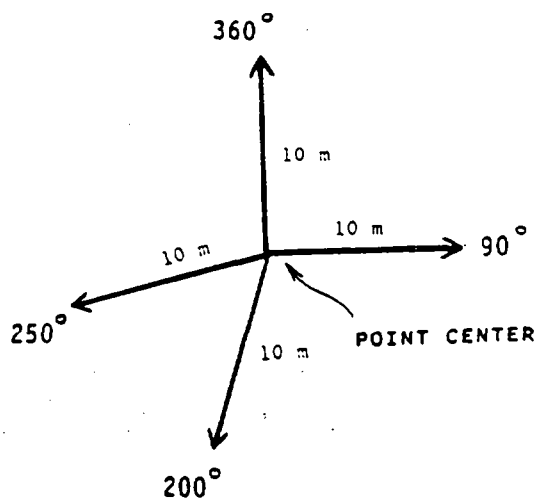
D. The line transect method. CWD that is not in piles created by direct human activity is sampled using the line transect method (also called the line intersect method). The line-transect system is a proven technique for estimating the volume and characteristics of downed trees, logs, and chunks of wood on the ground. In this method line transects are established, and downed pieces meeting specified dimensions and conditions are tallied if their central axis is intersected by an imaginary plane that passes vertically along the line transect. Instructions for sampling CWD in piles created by direct human activity are on page 133.



E. Locating and establishing line transects. At each of the 5 points on a plot, four 10-meter line transects are established to sample scattered (non-piled) CWD. Each 10-meter transect originates at the point center. The azimuths from point center to the end of the four lines are, respectively, 360 (0), 90, 200, and 250 degrees. The 10-meter distance is horizontal distance.

The 10-meter transects intergrade fully with plot layout rules in the eastern Washington inventory. As described in the section on plot layout, points are laid out so that point centers are at least 10 meters within sampled area, the same land class and stand condition. Thus, if a point is laid out properly, its transect lines automatically will fall in sampled area and in the correct land class and stand condition.

Diagram of line transect layout at a point.



Locate a transect by stretching a 30-meter tape from the point in the direction of the transect's azimuth (360, 90, 200, 250 degrees). Run the tape as straight and "on line" as possible. Once run, the tape should not be moved "off line" until the tally for the transect has been completed. If trees, rocks, slash piles, windrows or other obstacles are encountered along this line, visualize the line as passing straight through the obstacle; do not offset the line.

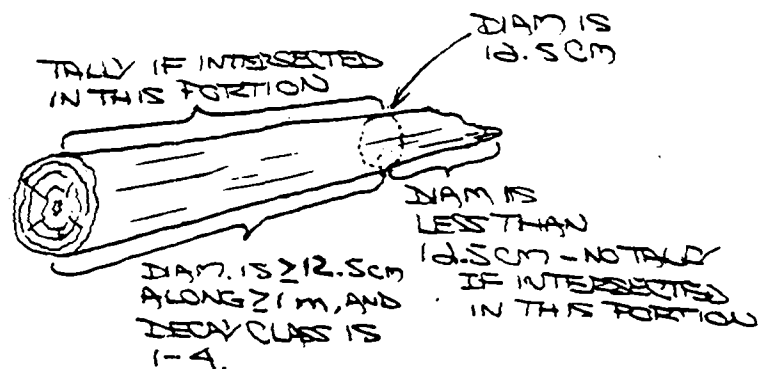
Use the procedures below to identify course woody debris that qualifies for tally along the sample plane.

F. Tally rules for course woody debris. Starting from point center, proceed along the 10-meter transect. Tally pieces of CWD that intersect the line and meet the following criteria:

1. Tally a piece only if it is at least 12.5 cm in diameter at the point of intersection with the transect plane.
2. Tally a piece only if it is at least 1 meter in length and 12.5 cm or more in diameter along that length.
3. Record pieces in piles created by natural causes: for example, windthrow, landslide, or fire. Do not record pieces that are part of a pile or windrow created by direct human activity; instead, see "Sampling residue piles" on page 133.
4. Tally a piece only if the sampled portion is in decay class 1, 2, 3, or 4. Do not tally the piece if the sampled portion is in decay class 5. Pieces in decay class 5 are not tallied because of the difficulty in defining logs of this category--the entire ground surface in some forests seems to be decay class 5 material--and the subjectivity in measuring them. See page 130 for more information about decay class.

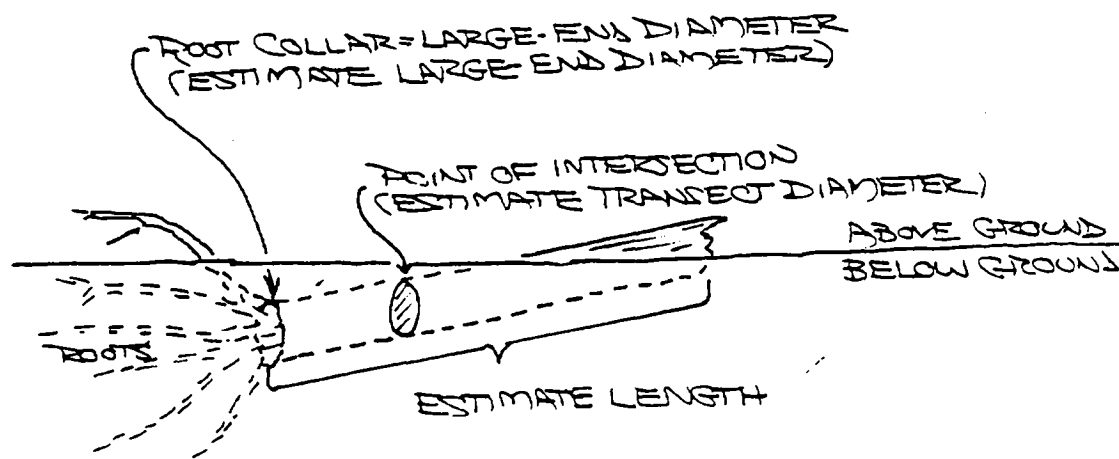
Do not kick apart or chop a piece to determine their decay class. Determine if a piece is in decay class 5 by probing it with a metal plot pin; if the pin does not penetrate through the center of the piece, it is in decay class 1 through 4, and not 5.

A piece can include one or more decay classes that differ from the decay class at the point of intersection.



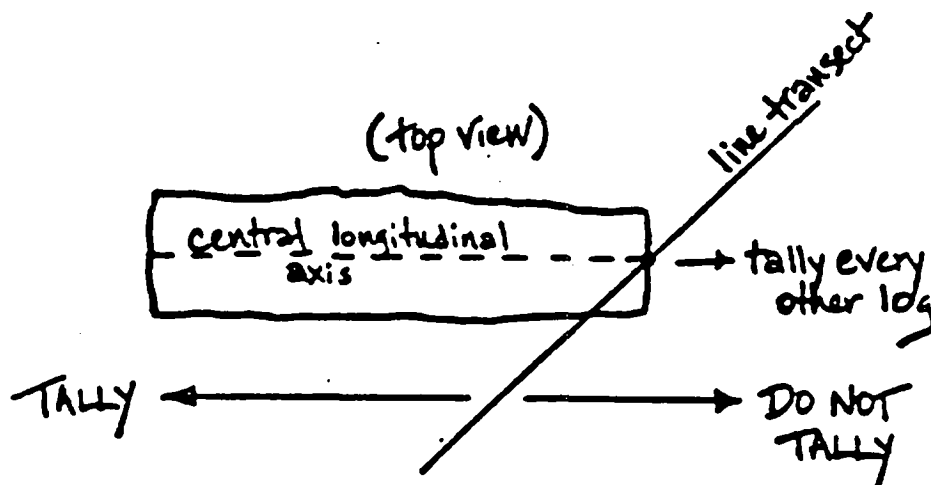
5. Tally a piece only if its central longitudinal axis is intersected by the transect plane. The piece may be on the ground or suspended above ground at the point of intersect or elsewhere along the bole.

6. Tally a piece regardless of whether the point of intersect occurs above ground or is buried--by natural or man-caused disturbance--in the litter, duff or mineral soil. The only restrictions on tallying buried pieces are (1) that the piece is visible somewhere above ground and (2) that it is estimated to meet the other criteria for tally.

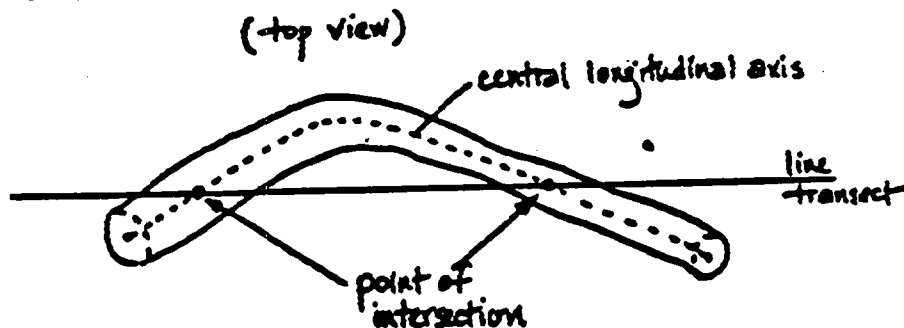


7. If a log is fractured across its diameter, and would pull apart at the fracture if pulled from either end, treat the log as two separate pieces. Tally only the piece intersected by the transect. If judged that it would not pull apart, tally the log as one piece.

8. If the central axis of the piece is exactly crossed (at the end of a log), tally the piece. Tally every other piece like this for the rest of the plot.



9. If the central axis of the piece is intersected more than once, tally it each time it is intersected.

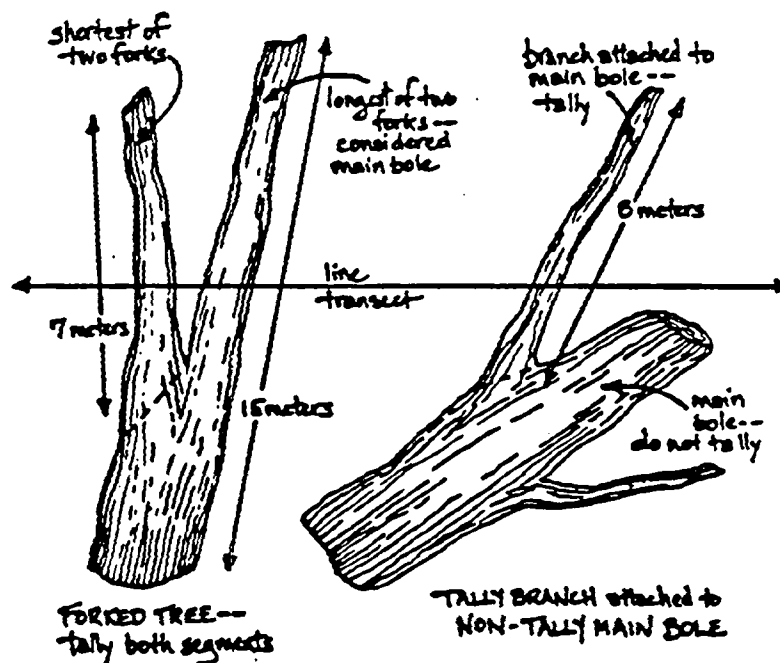


TALLY TWICE

10. Do not tally trees, snags or stumps that are leaning, but still supported by roots from falling over. Tally uprooted trees, snags and stumps that are no longer supported by roots.

11. Do not tally a piece if the transect intersects the piece on the root side of the root collar. Do not tally roots.

12. When the transect crosses forks or branches of one tree (i.e. two or more pieces that are connected), tally each qualifying piece separately. (Each individual piece must meet the minimum diameter and length requirements in order to be tallied.) In the case of forked trees, consider the longest of the two or more forks as the "main bole;" characteristics for this fork, such as length, should pertain to the entire main bole. For smaller forks, or for branches connected to a main bole (even if the main bole is not a tally piece), characteristics should pertain only to that portion of the piece up to the point where it attaches to the main bole.



Mark qualifying pieces in decay classes 1 through 3 at point of intersection with a diameter nail. Position the nail on top of the piece at the point of intersection with the transect. If possible, pound the nail into the piece so that only about 3 cm of the nail is left exposed; stop driving the nail if the next blow means breaking the piece or seriously disturbing the location of the piece.

G. Recording procedures. Record each piece as a single line entry on the data recorder. Complete the items indicated in the CWD tally guide.

If no logs are tallied on a transect line, record one line as follows: record the point number (PT), transect identifier (TI), the slope distance for the transect (LINE DIST), and enter "no tally" in remarks.

Note (again): Do not record pieces that are intersected by a transect and are part of a slash pile or windrow. Instead, tally the pile according to instructions on "Sampling residue piles on page 133."

CWD TALLY GUIDE

ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	
			LINE CWD			TRNST SML	LGE			DECAY #				
	PT	TI	DIST	DIST	SPC	DIAM	DIAM	DIAM	LENGTH	CLASS	CONT	ORNT	HOL?	REMARKS
			(CM)	(CM)		(CM)	(CM)	(CM)	(DM)					
	XX	X	LLLL	XXXX	XXX	XXXX	XXXX	XXXX	XXX	X	XX	X	X	

L - Record only on the last record on each transect.

F. Individual data items.

1. Item 1--Point number (PT). Record a 2-character code indicating the point from which the transect originates. Use the same codes as for trackable trees.

2. Item 2--Transect identifier (TI). Record a 1-letter code indicating the transect on which the log is sampled. The transect identifier codes are:

<u>Code</u>	<u>Identifier</u>
N	Log is tallied on the transect extending 360 degrees from point center.
E	Log is tallied on the transect extending 90 degrees from point center.
S	Log is tallied on the transect extending 200 degrees from point center.
W	Log is tallied on the transect extending 250 degrees from point center.

3. Item 3--Transect slope distance (LINE DIST). Record a 4-digit code indicating the measured slope distance from point center to the end of 10-meter transect. Measure and record to the nearest centimeter. Transect slope distance is recorded only on the last data line recorded for a transect. If no CWD tally is sampled on a transect, record point number, transect identifier and slope distance, and enter "no tally" in remarks. Transect slope distance will enable us to sample the same transect distance in future inventories.

4. Item 4--CWD slope distance (CWD DIST). Record a 4-digit code indicating the slope distance from point center to point where the transect plane intersects the longitudinal center of a tallied piece. Measure and record to the nearest ~~decimeter~~
centimeter.

If two or more tallied pieces have the same distance, indicate in remarks how the pieces are arranged. For example: the transect intersects two logs--one on top of the other--so that the distance recorded to the nearest decimeter is the same. In remarks, record "top log" for the log above, and "bottom log" for the log below.

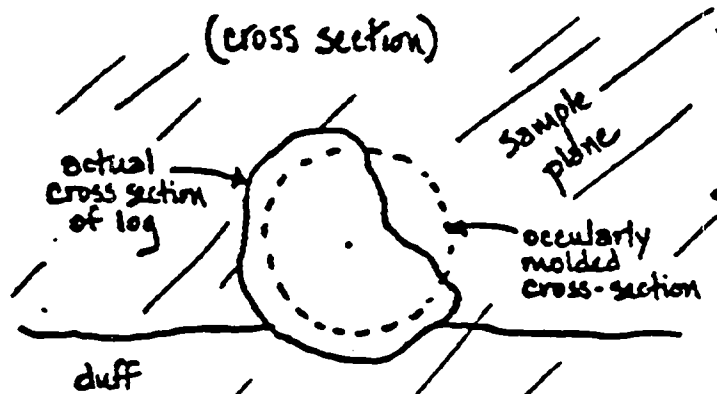
CWD slope distance will help us in future inventories to determine the status of CWD that we sample in the current inventory.

5. Item 5--Species (SPC). Record a 3-digit code indicating the species of the log. Species codes are the same as those used for "trackable" trees on page 87.

Even if species identification is difficult or uncertain for pieces of decay classes 1-4, make an "educated guess." In particular, it is important to distinguish hardwoods from softwoods. The piece's bark (either attached or sloughed and laying beside the piece) and the branching pattern--if branches are still present--may provide clues.

6. Item 6--Diameter at point of intersection (TRNST DIAM). Record a 4-digit code indicating the log's diameter at the point of intersection with the sample plane. Estimate the current outside diameter to the nearest centimeter; a measured diameter is necessary only if the diameter is within 2 centimeters of 12.5 cm.

Do not attempt to reconstruct for missing bark or wood. For pieces that are not round in cross-section because of missing chunks of wood or due to "settling" due to decay, ocularly mold the cross section of the piece into a circle of the same cross-sectional area, and estimate what the diameter of that circle would be. This applies to transect, small-end, and large-end diameters.



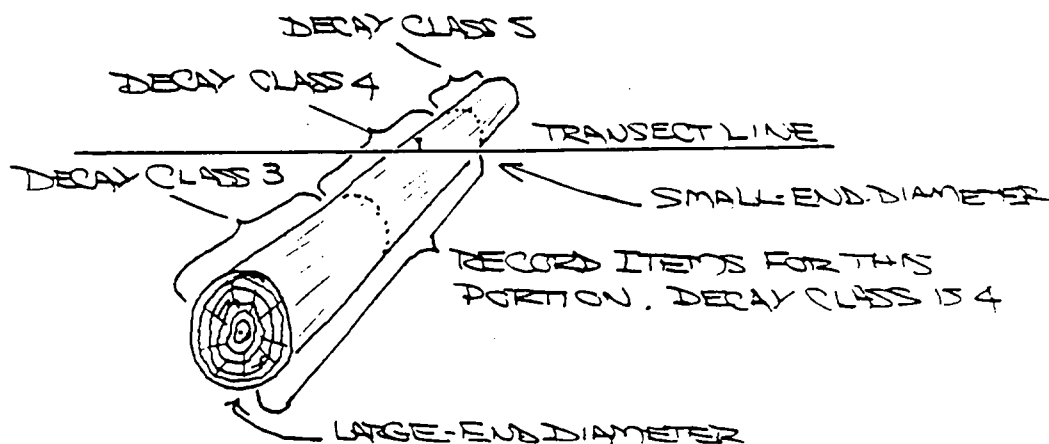
7. Item 7--Small-end (SML DIAM). Record a 4-digit code indicating the diameter at the piece's small end. The small-end diameter occurs either at (1) the small diameter end of the piece if the small-end diameter is ≥ 12.5 cm diam, or (2) at the point on the piece where the diameter tapers down to 12.5 cm.

8. Item 8--Large-end diameter (LGE DIAM). Record a 4-digit code indicating the large-end diameter of the piece. Estimate to the nearest centimeter. The large-end will occur either at a broken or sawn end, at a fracture, or at the root collar.

9. Item 9--Length. Record a 2-digit code indicating the total length of the piece. Estimate and record to the nearest decimeter. In estimating length, include only that portion of the piece that is 12.5 cm in diameter or larger and in decay classes 1 through 4.

10. Item 10--Decay class. Record a 1-digit code indicating the decay class of the log. Describe the decay class of the log at the point of intersection. (Logs may consist of more than one decay class.)

<u>Code</u>	<u>Decay class</u>
1	1
2	2
3	3
4	4
do not tally	5



Use the following table as a guide only, as the characteristics refer to Douglas-fir logs.

CHARACTERISTICS OF DOWN LOGS BY DECAY CLASS

Decay
class

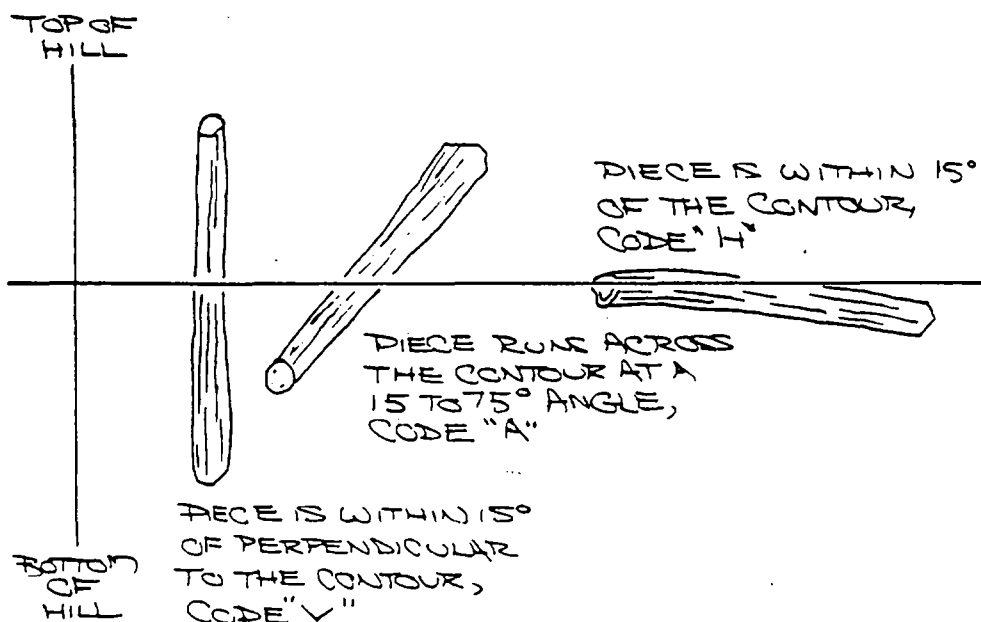
Bark	Structural integrity	Twigs less than 3 cm	Texture of rotten portions	Color of wood	Invading roots	Vegetation on log
1 intact	sound	present	intact	original color	absent	none
2 intact	sound	absent	mostly intact; sapwood partly soft	original color	absent	none surviving
3 sloughing	heartwood sound; supports own weight	absent	hard, large pieces	reddish brown or original color	sapwood only	conifer seedlings
4 detached or absent	heartwood rotten; does not support own weight; branch stubs pull out	absent	soft, small blocky pieces	reddish or light brown	through-out	hemlock less than 15 cm dbh smaller shrubs; moss
5 detached	none; branch stubs and pitch pockets usually have rotted down	absent	soft, powdery when dry	red-brown to dark brown	through-out	hemlock up to 200cm dbh; shrubs (some large); moss

Do not tally pieces that are decay class 5 at the point of intersection.
When tallying a piece, the portion sampled ends where decay class 5 begins.

11. Item 11--Number of other logs contacted (CONT). Record a 2-digit code indicating the number of other logs the tally log contacts. Do not count decay class 5 logs! Count only those logs that meet the criteria for tally (at least 1 m long and ≥ 12.5 cm diameter at point of intersection and at small end). They need not be tally logs to be counted.

12. Item 12--Orientation on slope (ORNT). Record a 1-letter code indicating the orientation of the log on the slope.

Code	Orientation
H	Piece is oriented within 15 degrees of the contour.
A	Piece is oriented across the contour.
V	Piece is oriented within 15 degrees of perpendicular to the contour.
F	Piece is on flat ground (0-10-percent slope).

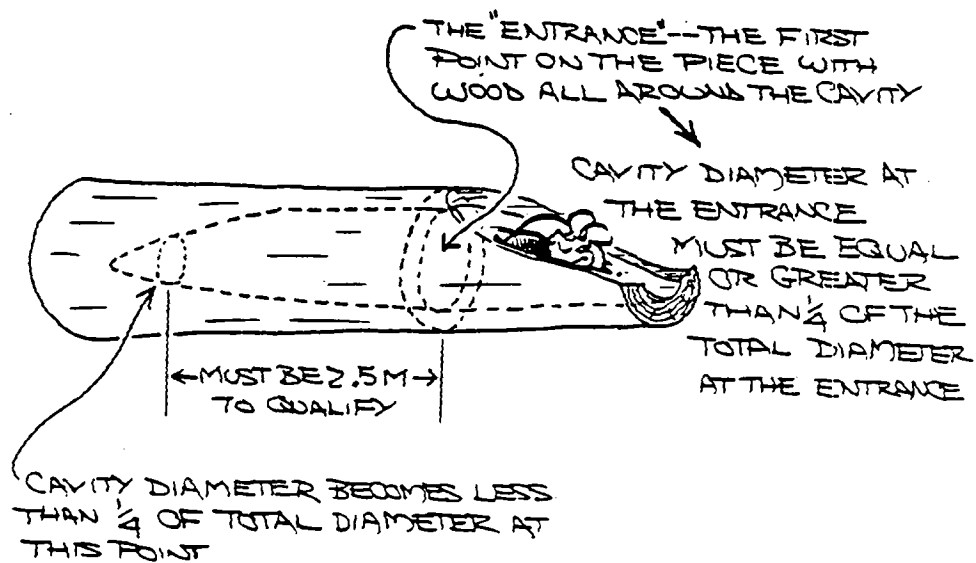


13. Item 13--Is the piece hollow? (HOL?). Record a 1-letter code indicating whether the piece is hollow.

Code	Description
Y	The piece is hollow.
N	The piece is not hollow.

A piece is hollow if a cavity extends at least 0.5 meters along the central longitudinal axis of the piece and the diameter of the entrance to the cavity is at least one-quarter the diameter of the piece where the entrance occurs. The entrance occurs at the point where the circumference of the cavity is whole--the point where wood is first present completely around the circumference of the cavity. The length of the cavity begins at this entrance.

If a piece is hollow, estimate the diameter of the entrance and the cavity length. Record this information in remarks.

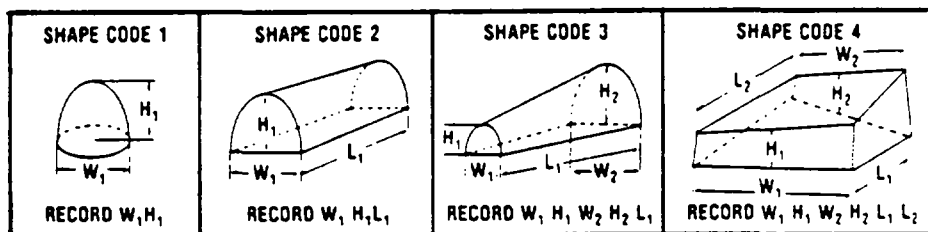


G. Sampling Residue Piles. The line transect method is not feasible when sampling CWD within residue piles and windrows. Piles and windrows will be sampled on a 10-meter fixed-radius plot.

Only piles and windrows created directly by human activity are candidates for sampling using these instructions. Examples of piles caused by human activity are slash piles, YUM piles, debris piles left around landings after yarding, and windrows created using bulldozers. CWD in piles created by windthrow, landslides, fires and other natural causes should be tallied on the line transects.

The following procedures apply when sampling piles created by human activity:

- a.) Determine which piles and windrows are partially or entirely within 10 horizontal meters of point center.
- b.) For each of these piles, examine its shape and decide which of the four shapes diagrammed below most resembles the pile.



c.) Record pile data on the pile tally sheet. Each sampled pile is a separate line entry. On the tally sheet, record the point number, azimuth from the point to the center of the pile, and shape code for each pile.

c.) Measure or estimate, and record average height, length and width dimensions for the each pile. Piles given shape code 3 require two separate width and height measurements. Piles given shaped code 4 require two separate height, width and length measurements.

Pile dimensions should be "ocularly smoothed-out" by the estimator--in effect, averaged out for unevenness occurring from irregular stacking and protruding pieces. If the pile is a windrow that is longer than 20 meters, record length as 20 meters and base your height and width estimates on the 20-meter segment in closest proximity to point center. Record all dimensions to the nearest meter.

d.) Estimate and record the proportion of pile's gross cubic volume that is within the 10-meter fixed-radius plot. The pile's gross cubic volume is the volume that one would calculate using the height, length and width data recorded in instruction b.). The pile's gross cubic volume includes pieces of CWD, non-CWD debris, any soil mixed up in the pile, and airspaces within the pile.

IX. APPENDICES
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APPENDIX - 1

FIELD CREW EDIT

Thorough field data editing involves repeated review of the data during the data collection process. The field crew is a key element in the edit process which begins while measuring the plot.

1. Before leaving the point: At each sample point, make sure that all required items are completed and correctly updated. Items to check include, but are not limited to:

- a.) Two references for each point and for the field grid location.
- b.) Tree number updated for OCC2 trees that were given new numbers.
- c.) OCC2 dbh, azimuth, and distance updated if unacceptably different from the OCC3 measurement.
- d.) Tree history changed for dead trees, and mortality trees entered again as snags (if they qualify).
- e.) Kind of "cull other" noted in remarks when coded.
- f.) Root disease, hardwood site, nonstockable conditions, and nonforest inclusions mapped and labeled.
- g.) Vegetation profile reviewed for completeness and correctness of codes.
- h.) CWD line transects and piles are sampled and recorded.

2. Before leaving the plot: Complete all required items on plot attribute record. (see plot and point attribute tally guide for required items) Complete point mapping card where appropriate.

- a.) Check photos to see if properly labeled and pinpricked (POD,RP,PC). Make sure photo number is correct on plot attribute record.
- b.) Estimator, recorder and date is complete. Location description is more than adequate.
- c.) Present condition/past disturbance is completed properly.
- d.) Plot diagram completed and understandable. Reasons provided on plot diagram for substituted points. Azimuth and distance between points completed. North indicated.
- e.) All Field-Interactive Items completed.
- f.) Plot jacket label completed

APPENDIX - 2-A

SAMPLE LANDOWNER LETTER

United States	Forest	Pacific Northwest	319 S.W. Pine
Department of	Service	Research	P.O. Box 3980
Agriculture		Station	Portland, OR 97208-3890

Reply To: 4810

Date: Sept 17, 1990

1^
2^
3^

The Pacific Northwest Research Station is reinventorying the forests of eastern Washington. The inventory data is collected every 10 years from permanent inventory plots located on a 3.4-mile grid across western Washington. These inventory plots were visited in 1980. Two of these plots fall on or near Acme Corp land in Columbia County. The approximate locations of these plots are T8N, R39E, Sec. 3, SWSE and T7N, R39E, Sec. 8, SWNE.

We ask your permission to enter or cross your land to measure the vegetation on these plots. Our field staff will be in your area between Oct 15 and October 30. If you wish, they will contact you before entering Acme land. If there is anyone we need to contact for access information such as locked gates, or if you have any other concerns, please contact us.

If you have any questions, please contact Tom Farrenkopf at 503-321-5885 for additional information. Thank you for your cooperation.

Sincerely,

Dale Baer
Supervisory Forester

APPENDIX - 2-B

SAMPLE RELEASE LETTER

R E L E A S E

The UNITED STATES FOREST SERVICE assumes liability for any damages caused by negligence of Forest Service personnel while entering upon or leaving (landowner name) property in connection with the reinventory of timber in the State of Washington, and (landowner) shall be held harmless for any liability cost or damage from injuries occurring to Forest Service personnel for any reason except the negligent or wrongful acts of (landowner name) while they are on the property owned or controlled by (landowner name).

CHARLES W. PHILPOT
Station Director
Pacific Northwest Research Station
US Department of Agriculture

APPENDIX - 3

CHECK PLOT PROCEDURES

- A. Objectives. Check plots are performed for several purposes:

1. To measure the accuracy of collected data;
2. To ensure that procedures for field plot measurement are uniformly understood and consistently followed;
3. To inform data collectors of the required accuracy standards;
4. To provide incentive to do excellent work.

B. Check plot policies. The following policies for conducting check plots will be followed:

1. Each person will be checked within the first two weeks of field work.
2. Check plots will continue during the entire season.
3. Each person will be checked on all types of plots.
4. All check plot items count equally for each person who was on the plot.

C. Check plot procedures.

1. In the field, the check cruiser checks all of the tree classifications/measurements, recording errors in red on the tree tally sheet. The check cruiser or assistant (one of the crew members on the original plot) makes all of the tree measurements, directly comparing them to the data on original husky hardcopy. Items that are outside the accuracy limits are rechecked. Final decisions on accuracy rest with the check cruiser. Errors are corrected in red with the correct value written above the item.

2. Completing the check plot form. Field plot items are organized into 14 categories on the check plot form. For each item the ratio of the number correct entries to the total number of entries for that item is recorded. The percent correct in each of the categories is calculated by dividing the number of correct items by the total number of items. Example: Crown class.....35/37

Each category is rated as (1) outstanding, (2) acceptable, or (3) less than acceptable, based on the accuracy standards indicated on the form.

County _____ Plot # _____ Crew _____ Date _____

Checked by _____ Date _____

1. PLOT LOCATION

To receive Outstanding:

(A) If remeasurement, the plot must be relocated. (B) If new the plot must be within type and +/- 5m. (C) All items 100%

To receive Acceptable:

(A) If remeasurement, the plot must be relocated. (B) If new, the plot must be within type and +/- 10m. (C) All items 90%

Score

- a.) Remeasurement-relocated-----
b.) New-within type-----
c.) Occasion 1,2,and 3 pinpricks in same correct spot and labeled.---
d.) RP tagged,pinpricked,labeled and described-----
e.) RP azimuth +/- 4 degrees, distance-plot must be findable 10 yrs
from now (judgement of checkers) and may +/- 5%-----
Crew % and rating-----

2. PLOT LAYOUT

To receive Outstanding:

(A) All points must be within land class and type. (B) All items 100%

To receive Acceptable:

(A) All points must be within land class and type. (B) All items 95%

Score

- a.) Points correctly numbered,dropped, or substituted -----
b.) Plot diagrammed accurately.Az and distance between points correct
c.) References tagged and recorded.Az +/- 4 degrees, distance +/- 20cm
d.) If other than standard layout,reasons recorded-----
Crew % and rating-----

3. TRACKABLE TREE PRISM TALLY

To receive Outstanding all items 100%

To receive Acceptable all items 98%

Score

- a.) Prism tally-----
Crew % and rating-----

4. TRACKABLE TREE FIXED RADIUS TALLY

To receive Outstanding all items 100%

To receive Acceptable all items 98%

Score

a.) Fixed radius tally-----
Crew% and rating-----

5. SITE TREE SELECTION (if needed)

To receive Outstanding all items 95%

To receive Acceptable all items 90%

Score

a.) Site tree selection fits model for each tree-----
b.) Site tree height and age meet standards-----
Crew % and rating-----

6. TREE HISTORY AND SPECIES

To receive Outstanding all items 100%

To receive Acceptable all items 98%

Score

a.) Tree history and species-----
Crew % and rating-----

7. HEIGHT AND DBH-TRACKABLE TREES

To receive outstanding all items 95%

To receive acceptable all items 88%

Score

a.) Height normally formed up to 20m tall +/- 1m-----
b.) Height normally formed 21m + +/- 4%-----
c.) Dbh +/- 2cm per 50cm-----
Crew % and rating-----

8. STANDING DEAD TREE TALLY

To receive Outstanding all items 95%

To receive Acceptable all items 90%

Score

a.) Snag tally-----
b.) Dbh +/- 10%-----
c.) Height +/- 10%-----
d.) Disappearance correct-----
e.) Decay class +/- 1 class-----
Crew % and rating-----

9. SAMPLE KIND AND LAND CLASS

To receive Outstanding or Acceptable all items 100%

- | | Score |
|------------------------|-------|
| a.) Sample kind----- | _____ |
| b.) Land class----- | _____ |
| Crew % and rating----- | _____ |

10. TREE IDENTIFICATION AND CLASSIFICATION

To receive Outstanding all items 95% To be Acceptable all items 90%

- | | Score |
|--|-------|
| a.) Height estimates for reconstructed trees +/- 2m----- | _____ |
| b.) Dbh nail height +/- 3cm, 2 or more nails in 75cm + trees----- | _____ |
| c.) Age-bored +/- 2 yr, estimated +/- 10%----- | _____ |
| d.) Crown ratio +/- 1 class----- | _____ |
| e.) Crown class - free to grow or not----- | _____ |
| f.) Growth impactor or death cause recognized, root rot correct----- | _____ |
| g.) Mistletoe recognized +/- 2 classes----- | _____ |
| h.) Cull other recognized +/- 10%----- | _____ |
| i.) Cull rot recognized- +/- 1 class ----- | _____ |
| j.) Comment on unusual data or specific cull----- | _____ |
| Crew % and rating----- | _____ |

11. POINT CLASSIFICATION

To receive Outstanding all items 95% To be Acceptable all items 90%

- | | Score |
|---|-------|
| a.) Nonstockable, root rot-recognized +/- 15%----- | _____ |
| b.) Vegetation percent cover +/- 15%----- | _____ |
| c.) Vegetation correct identification and code and layer----- | _____ |
| Crew % and rating----- | _____ |

12. PLOT AREA CLASSIFICATION

To receive Outstanding all items 95% To be Acceptable all items 90%

- | | Score |
|---|-------|
| a.) Stream proximity +/- 5 meter, stream class correct----- | _____ |
| b.) Aspest +/- 1 class----- | _____ |
| c.) Slope +/- 15%----- | _____ |
| d.) Harvest kind and cultural activity recognized, date +/- 25%----- | _____ |
| e.) Soil depth correct----- | _____ |
| f.) Plot description-questions on land class, productivity, treatment, disease, layout, harvest, etc addressed----- | _____ |
| g.) Owner change recognized----- | _____ |
| Crew % and rating----- | _____ |

13. OTHER ITEMS NOT PREVIOUSLY COVERED (if needed-inspectors decision)

Outstanding-100%, Acceptable-95%

- | | Score |
|------------------------|-------|
| a.) _____ | _____ |
| Crew % and rating----- | _____ |

14. COURSEE WOODY DEBRIS

Outstanding-95%, Acceptable-90%

Piece tally-----	_____
Intersection dia +/- 10%-----	_____
End dia +/- 10%-----	_____
Length +/- 10 %-----	_____
Decay Class +/- 1 class-----	_____
Pieces intersected-----	_____
Piece orientation-----	_____
Hollowness-----	_____
Piles +/- 10%-----	_____
TOTAL	_____

OUTSTANDING ITEMS

ACCEPTABLE ITEMS

UNACCEPTABLE ITEMS

APPENDIX - 4
SLOPE CORRECTION TABLE

PERCENT	EXPANSION FACTOR	EXPANSION FACTOR RECIPROCAL	SLOPE DIST. FOR 21.3m	SLOPE DIST. FOR 36.9m	SLOPE DIST. FOR 42.6m
10	1.005	1.00	21.3	36.9	42.8
15	1.010	.99	21.5	37.2	43.0
20	1.020	.98	21.7	37.6	43.4
25	1.031	.97	22.0	38.0	44.0
30	1.044	.96	22.2	38.5	44.4
35	1.060	.94	22.6	39.1	45.2
40	1.077	.93	22.9	39.7	45.8
45	1.097	.91	23.4	40.5	46.8
50	1.118	.89	23.8	41.2	47.6
55	1.141	.88	24.3	42.1	48.6
60	1.166	.86	24.8	43.0	49.6
65	1.194	.84	25.4	44.0	50.8
70	1.221	.82	26.0	45.0	52.0
75	1.250	.80	26.6	46.1	53.2
80	1.281	.78	27.3	47.3	54.6
85	1.312	.76	27.9	48.4	55.8
90	1.345	.74	28.6	49.6	57.2
95	1.379	.72	29.4	50.9	59.2
100	1.414	.70	30.1	52.2	60.2
105	1.450	.69	30.9	53.5	61.8
110	1.486	.67	31.7	54.8	63.4
115	1.524	.66	32.5	56.2	65.0
120	1.562	.64	33.3	57.6	66.6
125	1.601	.62	34.1	59.1	68.2
130	1.640	.61	34.9	60.5	69.8
135	1.680	.60	35.8	62.0	71.4
140	1.720	.58	36.6	63.5	73.2
145	1.761	.57	37.5	65.0	75.0
150	1.803	.55	38.4	66.5	76.8

APPENDIX - 5
POINT SAMPLING HORIZONTAL LIMITING DISTANCES (METRIC)
40 (English) BAF PRISM (F = 0.165)

DBH cm	Dist.m	DBH cm	Dist.m
0.1	.02	41	6.77
.2	.03	42	6.93
.3	.05	43	7.10
.4	.07	44	7.26
.5	.08	45	7.42
.6	.10	46	7.59
.7	.12	47	7.76
.8	.13	48	7.92
.9	.15	49	8.08
1	.17	50	8.25
2	.33	51	8.42
3	.50	52	8.58
4	.66	53	8.74
5	.82	54	8.91
6	.99	55	9.08
7	1.15	56	9.24
8	1.32	57	9.40
9	1.48	58	9.57
10	1.65	59	9.74
11	1.82	60	9.90
12	1.98	61	10.06
13	2.15	62	10.23
14	2.31	63	10.40
15	2.48	64	10.56
16	2.64	65	10.72
17	2.80	66	10.89
18	2.97	67	11.06
19	3.14	68	11.22
20	3.30	69	11.55
21	3.46	70	11.72
22	3.63	71	11.88
23	3.80	72	12.04
24	3.96	73	12.21
25	4.12	74	12.38
26	4.29	75	12.54
27	4.46	76	12.70
28	4.62	77	12.87
29	4.78	78	13.04
30	4.95	79	13.20
31	5.12	80	13.36
32	5.28	81	13.53
33	5.44	82	13.70
34	5.61	83	13.86
35	5.78	84	14.02
36	5.94	85	14.19
37	6.10	86	14.36
38	6.27	87	14.52
39	6.44	88	14.68
40	6.60	89	14.85
		90	15.02

APPENDIX - 6

METRIC EQUIVALENTS

Length

1 inch = 2.54 centimeters (cm)

1 foot = 0.3048 meter (m)

1 mile = 1.609 kilometers (km)

Area

1 acre = 0.4 hectare (ha) (approximately)

5 acres = 2 hectares (ha) "

1,000 acres = 404.7 hectares (ha) (exactly)

1 hectare = 2.471 acres "

Volume

1,000 cubic feet = 28.3 cubic meters (m^3)

1 cubic foot per acre = 0.07 cubic meter per hectare (m^3/ha)

APPENDIX - 7

OCC2 CODES FOR DAMAGE/CAUSE OF DEATH

Code	Cause of death	Code	Snag condition
10	insects	92	Hard snag w/cavities or dens
20	disease	93	Hard snag w/o apparent use
30	fire	94	Soft snag w/cavities or dens
40	animal	95	Soft snag w/o apparent use
50	weather	96	Down salvable dead tree with
60	suppression		> 40 cu. ft. gross volume
70	other damage (unknown)		
80	killed in a cultural operation		
90	killed outright in logging, but not cut down		

Code	Damage
00	no serious damaging agent
11	bark beetles
12	defoliators
13	balsam woolly aphid
14	Sitka spruce weevil
15	spruce budworm
21	white pine blister rust
22	other rust cankers on main bole
23	conks on bole, limb, or ground near tree
24	Phellinus pini conks
25	Echinodontium tinctorium conks
26	Phaeolus schweinitzii conks
27	other diseases and rot
29	Phellinus weirii
30	fire damage
40	animal damage
51	lightning
52	wind
53	other weather
69	suppressed sapling
71	natural mechanical injury
72	top out, dead, or spike top
73	forked top or multiple stem
74	deformed top above merchantable height in under-rotation-age tree
75	needles or leaves noticeably short, and/or sparse or off-color
77	excessive lean (over 15 degrees from vertical)
78	excessive forking (a hardwood that forks within the first 8 feet or a conifer that forks within the first 12 feet, the main fork of which forks again within 8 or 12 feet, respectively)
81	damage by power equipment
82	other logging damage
83	damage by cutting
84	damage by chemicals
91	excessive taper or deformity--will not produce a 12-foot conifer or 8-foot hardwood log

APPENDIX - 8

TALLY GUIDES

TALLY REQUIREMENTS BY SAMPLE KIND

<u>Sample kind</u>	<u>OCC 3 GLC</u>	<u>Plot attr. record</u>	<u>Point attr. record</u>	<u>Point mapping record</u>	<u>Tree tally needed</u> <u>On these kinds of points:</u> ¹	
2,4,7	20,41 49	1-10 ³ 11-13 ³ 15-28 ³	All items	YES ²	-Reference trees -Site trees ² -2.1-m fixed-radius plot -40E BAF variable-radius plot--trackable trees and standing dead -10-m transects for CWD -10-m fixed-radius plot for piles	N/R,N N/R,N or in plot area N/R,N N/R,N N/R,N N/R,N
4	44,46	1-10 ³ 11-13 15-23 25-28	All items except footnote 4	YES	-Reference trees -Site trees -2.1-m fixed-radius plot -40E BAF variable-radius plot--trackable trees and standing dead -10-m transects for CWD -10-m fixed-radius plot for piles	N N or in plot area N N N N
8	41,44, 46	1-10 ³ 11-23 25-28	All items except footnote 4	NO	-Reference trees	N
9	61-69, 92	1-10 ³	--	NO	--	--

¹N/R = new/remasured point; N = new or reconstructed point.²Refer to Interactive Items on plot attribute record.³OCC2 data items (6, 8, and 24) not required if plot is new-to-inventory.⁴Complete all items except nonstockable area, hardwood site, and root disease.

TALLY GUIDE FOR N/R POINTS ON SAMPLE KINDS 2 AND 7
REMEASUREMENT PLOTS

LINE#	PT	TH	SPP	A2M	DIST	TRN	OC1 INC	OC1 DRH	OC2 DRH	OC3 DRH	OC2 HGT	OC3 HGT	BH AGE	C/B	C/C	G1	D/ U M	CL	CO	CR	OC			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
XXXX	NR	1	XXX	XXX	XXXX	---	---	LLLL	XXXX	XXXX	PPP	XXX	XXX	X	X	X	XX	--	C	M	--	-	-	-
XXXX	NR	1	XXX	XXX	XXXX	XXX	---	LLLL	XXXX	XXXX	PPP	HHH	XXX	X	X	X	XX	--	C	M	XX	X	-	-
XXXX	NR	1	XXX	XXX	XXXX	XXX	---	LLLL	XXXX	XXXX	PPP	HHH	XXX	X	X	X	XX	--	C	M	XX	X	-	-
XXXX	NR	1	XXX	XXX	XXXX	XXX	UUU	UUUU	UUUU	XXXX	---	HHH	XXX	X	X	X	XX	--	C	M	XX	X	-	-
XXXX	NR	2	XXX	XXX	XXXX	XXX	BBB	---	BBB	XXXX	---	HHH	XXX	R	X	R	XX	--	C	M	XX	X	-	-
XXXX	NR	3	XXX	XXX	---	---	---	LLLL	FFFF	---	PPP	---	XXX	X	-	X	XX	--	C	M	--	-	-	-
XXXX	NR	3	XXX	XXX	XXXX	XXX	---	LLLL	FFFF	---	PPP	---	XXX	X	-	X	XX	--	C	M	XX	X	-	-
XXXX	NR	4	XXX	XXX	XXXX	---	---	---	---	XXXX	---	XXX	XXX	-	X	-	XX	--	C	M	--	-	-	-
XXXX	NR	4	XXX	XXX	XXXX	XXX	---	---	---	XXXX	---	HHH	XXX	-	X	-	XX	--	C	M	XX	X	-	-
SSSS	NR	5	XXX	XXX	---	---	---	LLLL	FFFF	---	PPP	---	XXX	X	-	X	XX	XX	C	M	--	-	-	-
SSSS	NR	5	XXX	XXX	XXXX	XXX	---	LLLL	FFFF	---	PPP	---	XXX	X	-	X	XX	XX	C	M	XX	X	-	-
XXXX	NR	6	XXX	XXX	XXXX	---	---	---	---	RRRR	XXXX	RRR	XXX	XXX	R	X	R	XX	--	C	M	--	-	-
2XXXX	NR	6	XXX	XXX	XXXX	XXX	BBB	---	BBB	XXXX	---	HHH	XXX	R	X	R	XX	--	C	M	XX	X	-	-
XXXX	NR	7	XXX	XXX	XXXX	---	---	---	---	XXXX	XXXX	XXX	XXX	---	-	-	-	XX	XX	-	---	-	-	-
XXXX	NR	7	XXX	---	---	---	---	---	---	XXXX	---	XXX	---	---	-	-	-	XX	XX	-	---	-	-	-
SSSS	NR	7	XXX	XXX	XXXX	---	---	---	---	RRRR	XXXX	RRR	XXX	---	-	-	-	RR	XX	-	---	-	-	-
XXXX	NR	8	XXX	XXX	XXXX	XXX	---	LLLL	FFFF	---	PPP	---	XXX	X	-	X	XX	XX	C	M	XX	X	-	-
XXXX	NR	9	XXX	XXX	XXXX	---	---	---	---	XXXX	---	---	---	-	-	-	-	-	-	-	-	-	-	-
XXXX	NR	0	---	---	---	---	---	---	---	---	---	---	---	-	-	-	-	-	-	-	-	-	-	-

REMARKS:

Live tree tallied (12.5 cm dbh at OCC2. Still live and (12.5 cm dbh at OCC3). On 2.1m fixed-radius plot.

Live tree tallied (12.5 cm dbh at OCC2. Still live and (12.5 cm dbh at OCC3). On 2.1m fixed-radius plot.

Live tree tallied (12.5 cm dbh at OCC2 and OCC3. Full remeasurement plot at OCC2.

Live tree tallied (12.5 cm dbh at OCC2 and OCC3. Walk-thru plot at OCC2.

Live tree on N/R point (12.5 cm dbh at OCC3) and not on the 2.1m fixed-radius plot. Not tallied and not missed at OCC2. (Ongrowth tree)

Tree tallied or reconstructed as live and (12.5 cm dbh at OCC2. Culturally killed since OCC2. On 2.1m fixed-radius plot.

Tree reconstructed (SK 2 only) or tallied live and (12.5 cm dbh at OCC2. Culturally killed since OCC2.

Live tree (12.5 cm dbh at OCC3) on 2.1m fixed-radius plot. Not alive at OCC2.

Live tree (12.5 cm dbh at OCC3) on the 2.1m fixed-radius plot. Not alive at OCC2. Bore for BH age.

Tree tallied or reconstructed as live and (12.5 cm dbh at OCC2. Died since OCC2. On 2.1m fixed-radius plot.

Tree reconstructed (SK 2 only) or tallied live and (12.5 cm dbh at OCC2. Died since OCC2.

Live tree (12.5 cm dbh at OCC3). Missed but "in" at OCC2 or a seedling not tallied at OCC2. OR: an additional stocking seedling at OCC3 that was present but not qualified as OCC2 tally. On 2.1m fixed-radius plot.

Live tree (12.5 cm dbh at OCC3). Missed but "in" at OCC2.

Snag (12.5 cm dbh at OCC2 and OCC3.

Snag (12.5 cm dbh at OCC2. Gone or (12.5 cm dbh or (2m tall at OCC3).

Snag (12.5 cm dbh at OCC2 and OCC3. Missed at OCC2.

Tree reconstructed (SK 2 only) or tallied live and (12.5 cm dbh at OCC2. Harvested since OCC2

Reference only tree.

Point with no live tally at OCC2 or OCC3.

TALLY GUIDES

APPENDIX - 8

X - Item must be completed

B - Establish OCC2 dbh by boring increment. Record increment between OCC2 and OCC3 in OC3 INC. "Remarks". If a hardwood, estimate OCC2 dbh rather than bore increment.

C - Conifers only. Code as of OCC2 if reconstructed as alive at OCC2, but now culturally killed, dead, or harvested.

F - If tree is reconstructed, record current dbh as OCC2 dbh and reconstruct items 15, 17, and if OCC2 dbh (12.5 cm, reconstruct items 23 and 24. If tree was live OCC2 tally, but has no downloaded OCC2 dbh, record the larger: OCC1 dbh or current dbh.

H - Measure heights on all normally-formed live trees (12.5 cm dbh on points 1 and 2. Continue measuring heights on normally-formed conifers until a conifer (12.5 cm dbh have measured heights. Continue measuring heights on normally-formed hardwoods until a hardwood (12.5 cm dbh have measured heights. Also measure height on 1st live tree (12.5 cm dbh of a species not previously tallied on the plot. If normally-formed. Also measure height on live normally-formed live tree that are of largest and smallest dbh (12.5 cm dbh on the plot. If less than 10 live prism tally trees on the plot, measure or estimate height on remaining prism trees without a height.

L - OCC1 dbh is downloaded/printed if recorded during OCC1 inventory.

M - Hardwoods only. Code as of OCC2 if reconstructed as alive at OCC2, but now culturally killed, dead, or harvested.

P - Downloaded/printed if measured or field-estimated at OCC2. If OCC2 dbh is (12.5 cm and no OCC2 height is present, estimate OCC2 height.

R - Reconstruct the item. If TH=6 and OCC3 dbh (12.5 cm, reconstruct OCC2 dbh if alive at OCC2.

S - Same line number if a mortality tree and a snag are the same tree.

U - OCC1 dbh is listed. If OCC1 dbh > OCC3 dbh: check OC1 DBH and establish OCC2 DBH, revise OCC1 dbh (if needed); record OCC2 dbh, record increment between OCC2 and OCC3 in OC3 INC, and... record increment between OCC1 and OCC3 in "Remarks".

TALLY GUIDE FOR N POINTS ON PLOTS WITH SAMPLE KINDS 2, 4, AND 7

LINE#	PT	TH	SPP	AZM	DIST	TRN	OC3 INC	OC1 DBH	OC2 DBH	OC3 DBH	OC2 HGT	OC3 HGT	BH AGE	C	B	C	G	I	D/ U	W	CL	CO	CR	DC
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
XXXXX	NX	2	XXX	XXX	XXXX	---	---	---	---	XXXX	RRR	XXX	XXX	R	X	R	X	XX	--	C	M	--	--	--
XXXXX	NX	2	XXX	XXX	XXXX	XXX	BBB	---	BBBB	XXXX	---	HHH	XXX	R	X	R	X	XX	--	C	M	XX	X	--
XXXXX	NX	3	XXX	XXX	---	---	---	---	DDDD	---	RRR	---	XXX	R	--	--	--	--	--	C	M	--	--	--
XXXXX	NX	3	XXX	XXX	---	---	---	---	DDDD	---	---	---	XXX	R	--	--	--	--	--	C	M	--	--	--
XXXXX	NX	4	XXX	XXX	XXXX	---	---	---	---	XXXX	---	XXX	XXX	--	X	--	X	XX	--	C	M	--	--	--
XXXXX	NX	4	XXX	XXX	XXXX	XXX	---	---	---	XXXX	---	HHH	XXX	--	X	--	X	XX	--	C	M	XX	X	--
SSSSS	NX	5	XXX	XXX	---	---	---	---	DDDD	---	RRR	---	XXX	R	--	--	--	--	--	XX	C	M	--	--
SSSSS	NX	5	XXX	XXX	---	---	---	---	DDDD	---	---	---	XXX	R	--	--	--	--	--	XX	C	M	--	--
XXXXX	NX	7	XXX	XXX	XXXX	---	---	---	XXXX	XXXX	XXX	XXX	---	--	--	--	RR	XX	--	--	--	--	--	X
XXXXX	NX	7	XXX	---	---	---	---	---	XXXX	---	XXX	---	---	--	--	--	RR	XX	--	--	--	--	--	--
SSSSS	NX	7	XXX	XXX	XXXX	---	---	---	RRRR	XXXX	RRR	XXX	---	--	--	--	RR	XX	--	--	--	--	--	X
XXXXX	NX	8	XXX	XXX	---	---	---	---	XXXX	---	---	---	XXX	R	--	--	--	--	--	XX	C	M	--	--
XXXXX	NX	9	XXX	XXX	XXXX	---	---	---	---	XXXX	---	---	---	---	---	---	---	---	---	---	---	---	---	---
XXXXX	NX	0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

REMARKS:

Live tree <12.5 cm dbh at OCC3. Live at OCC2.
 Live tree >12.5 cm dbh at OCC3. Live at OCC2.
 Tree reconstructed as live and <12.5 cm dbh at OCC2. Culturally killed since OCC2. On 2.1m fixed-radius plot.
 Tree reconstructed as live and >12.5 cm dbh at OCC2. Culturally killed since OCC2.
 Live tree <12.5 cm dbh at OCC3 on 2.1m fixed-radius plot. Not alive at OCC2.
 Live tree >12.5 cm dbh at OCC3 on the 2.1m fixed-radius plot. Not alive at OCC2. Bore for BH Age.
 Tree reconstructed as live and <12.5 cm dbh at OCC2. Died since OCC2. On 2.1m fixed-radius plot.
 Tree reconstructed as live and >12.5 cm dbh at OCC2. Died since OCC2.
 Snag >22.5 cm dbh reconstructed as "in" at OCC2 and OCC3.
 Snag reconstructed as snag >22.5 cm dbh "in" at OCC2. Gone or <22.5 cm dbh or <2m tall at OCC3.
 Snag >22.5 cm dbh at OCC2 and OCC3. Missed at OCC2.
 Tree reconstructed as live and >12.5 cm dbh at OCC2. Harvested since OCC2.
 Reference only tree.
 Point with no live tally at OCC2 or OCC3.

ALL POINT NUMBERS ARE N POINTS:

X - Item must be completed

B - Establish OCC2 dbh by boring increment. Record increment between OCC2 and OCC3 in OC3 INC. If a hardwood, estimate OCC2 dbh rather than bore increment.

C - Conifers only. Code as of OCC2 if reconstructed as live at OCC2, but now culturally killed, dead, or harvested.

D - Record current dbh for OCC2 dbh.

H - Measure heights on all normally-formed live trees >12.5 cm dbh on points 1 and 2. Continue measuring heights on normally-formed conifers until 4 conifers >12.5 cm dbh have measured heights. Continue measuring heights on normally-formed hardwoods until 4 hardwoods >12.5 cm dbh have measured heights. Also measure height on 1st live tree >12.5 cm dbh of a species not previously tallied on the plot if normally-formed. Also measure height on live normally-formed live tally that are of largest and smallest dbh >12.5 cm dbh on the plot. If less than 16 live prism tally trees on the plot, measure or estimate height on remaining prism trees without a height.

M - Hardwoods only. Code as of OCC2 if reconstructed as live at OCC2, but now culturally killed, dead, or harvested.

R - Reconstruct the item.

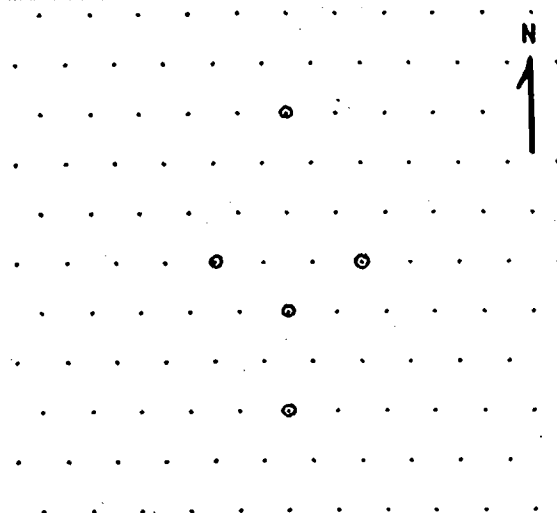
S - Same line number if a mortality tree and a snag are the same tree.

APRIL 16, 1991

1990-1991 EASTERN WASHINGTON FOREST INVENTROY PLOT RECORD

COUNTY NAME _____ PLOT _____ DATE _____
ESTIMATOR(S) _____ RECORDER(S) _____

PLOT LAYOUT:



RP: SPECIES _____ DBH _____ cm AZ _____ SLOPE DISTANCE _____ m

LOCATION DESCRIPTION

PRESENT CONDITION/PAST DISTURBANCE

PT LOCATION:
PT - PT AZ DIST(dm)

INTERACTIVE ITEMS: (O = OFFICE, F = FIELD)

- O - FIELD CHECK ITEM: _____
- O - OWNER RESPONSE: YES (Card enclosed) NO (Need to check owner list)
- F - CONTACT OFFICE ABOUT... _____
- F - IS DATE OF HARVEST SINCE OCC2 CONFIRMED? _____
- F - DOES OWNER CLASS DIFFER FROM CURRENT OWNER? _____ IF YES, DATE OF CHANGE _____
- F - DOES PLOT DIRECTION DIFFER FROM P1 DIRECTION? _____ IF YES, EXPLAIN: _____
- F - REMEASURED PLOTS ONLY: PINPRICK CORRECT? _____ IF NO, CORRECTED BY _____
- DOES THE PLOT NEED RE-P1? _____
- F - REMEASURED PLOTS ONLY: OCC2 GLC UPDATED? _____ (IF YES, EXPLAIN ABOVE)

SAMPLE PLOT RECORDS

[illegible]

SAMPLE PLOT RECORDS

COUNTY .. PLOT ... DATE

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EASTERN WASHINGTON POINT MAPPING RECORD

COUNTY _____ PLOT _____

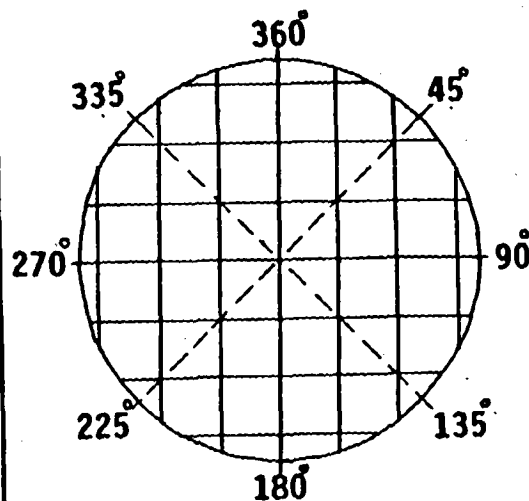
DISEASE CODES

PW = Phellinus (Laminated)
BS = Black stain
AM = Armillaria
FA = Fomes annosus
UK = Unknown
NO = None Present

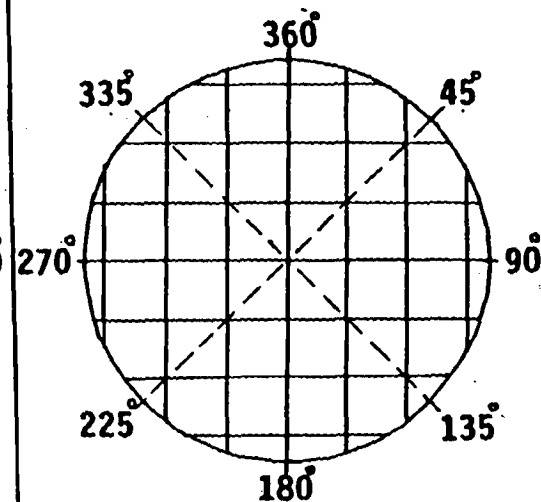


GRID INTERVAL = 3 METERS
EACH SQUARE = 3 PERCENT

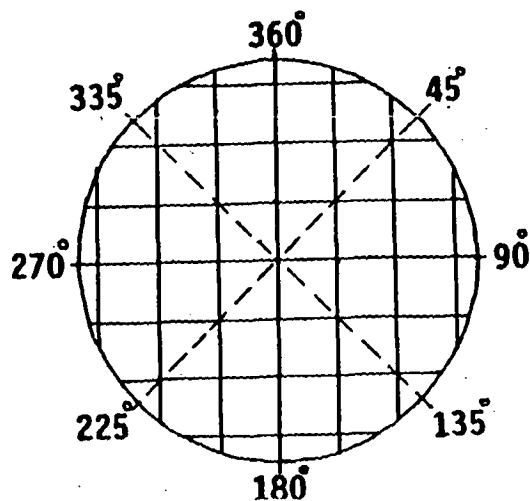
POINT # _____ DISEASE _____



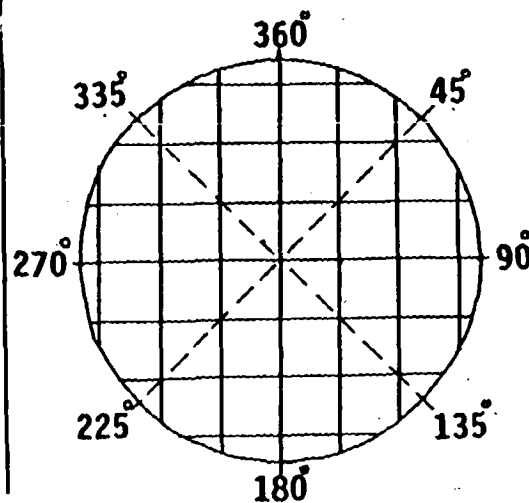
POINT # _____ DISEASE _____



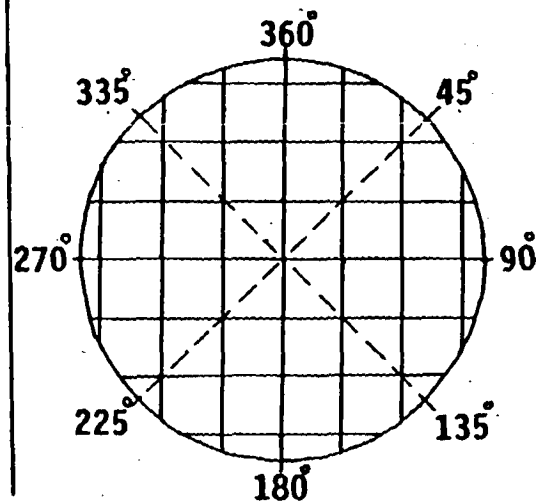
POINT # _____ DISEASE _____



POINT # _____ DISEASE _____



POINT # _____ DISEASE _____



SAMPLE PLOT RECORDS

APPENDIX - 9

COUNTY..... COUNTY CODE.... PLOT.....

REMARKS:

LINE#	PT	TH	SPP	AZM	DIST	TRN	INC	OC3 DBH	OC1 DBH	OC2 DBH	OC3 HGT	OC2 HGT	OC3 BH	BH	02 CR	03 CR	02 CC	03 CC	GI	U	M	CL	CO	CR	DC
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	

[illegible]

APPENDIX - 9
SAMPLE PLOT RECORDS

SAMPLE PLOT RECORDS

COUNTY # _____ PLOT # _____

PAGE: _____

[illegible]

APPENDIX - 9

RESIDUE PILE TALLY SHEET

COUNTY # _____ PLOT # _____

PAGE: _____

[illegible]

APPENDIX - 10

SITE INDEX TABLES/PRODUCTIVITY CLASSES

PRODUCTIVITY CLASSES:

Site class of timberland is based on potential yields of mean annual growth at culmination of increment in fully stocked stands of desirable trees.

POTENTIAL YIELD--MEAN ANNUAL INCREMENT

<u>SITE CLASS</u>	<u>CUBIC FT PER ACRE</u>	<u>CUBIC METERS PER HECTARE</u>
1	225 or more	15.7 or more
2	165 to 224	11.5 to 15.6
3	120 to 164	8.4 to 11.4
4	85 to 119	5.9 to 8.3
5	50 to 84	3.5 to 5.8
6	20 to 49	1.4 to 3.4
7	less than 20	less than 1.4

SITE INDEX TABLES/PRODUCTIVITY CLASSES

SITE INDEX TABLE
 PONDEROSA PINE - 122^{1/}
 Upper Limit of Site Indices

S.I.	40	50	60	70	80	90	100	110	120	130	140
B H											
AGE											
20	0	9	29	48	68	87	107	126	146	165	185
25	4	25	46	67	87	108	129	150	171	191	212
30	19	41	62	84	106	128	150	172	194	215	237
35	33	56	79	101	124	147	170	192	215	238	261
40	47	71	94	118	141	165	188	212	235	259	282
45	60	85	109	133	157	181	206	230	254	278	303
50	73	98	123	147	172	197	222	247	272	297	321
55	84	110	135	161	186	212	237	263	288	314	339
60	95	121	147	173	199	225	251	277	303	329	356
65	105	131	158	185	211	238	264	291	318	344	371
70	113	141	168	195	222	249	277	304	331	358	385
75	122	149	177	205	232	260	288	316	343	371	399
80	129	157	185	214	242	270	298	327	355	383	412
85	135	164	193	222	251	279	308	337	366	395	423
90	141	170	200	229	258	288	317	347	376	405	435
95	146	176	206	236	266	296	326	355	385	415	445
100	150	181	211	242	272	303	333	364	394	425	455
110	157	189	221	252	284	315	347	379	410	442	474
120	162	195	228	260	293	326	359	392	424	457	490
130	165	199	233	267	301	335	369	403	437	471	505
140	155	190	225	259	294	329	364	399	434	469	504
150	158	194	230	266	302	338	374	409	445	481	517
160	162	199	236	272	309	346	383	419	456	493	530
170	166	203	241	279	316	354	391	429	467	504	542
180	169	208	246	285	323	362	400	439	477	516	554
190	173	212	251	291	330	369	409	448	487	527	566
200	176	216	256	296	337	377	417	457	497	538	578
210	179	220	261	302	343	384	425	466	507	548	589
220	183	224	266	308	350	392	433	475	517	559	601
230	186	228	271	314	356	399	442	484	527	569	612
240	189	232	276	319	363	406	450	493	536	580	623
250	192	236	281	325	369	413	458	502	546	590	634
260	195	240	285	330	375	420	465	510	555	600	645
270	199	244	290	336	382	427	473	519	565	611	656
280	202	248	295	341	388	434	481	528	574	621	667
290	205	252	299	347	394	441	489	536	583	631	678
300	208	256	304	352	400	448	496	544	593	641	689
Cu. Ft.											
Site	7		6			5		4		3	
Class											

^{1/} Source: Barrett, James W.; "Height growth and site index curves for managed even-age stands of ponderosa pine in the Pacific Northwest"; Research Paper PNW-232. 1978.

DOUGLAS-FIR SITE INDEX TABLE
UPPER LIMIT OF SITE INDICES

S.I.	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
B.H. AGE																
20	0	7	24	42	59	77	94	112	129	147	164	181	199	216	234	251
25	2	21	40	59	78	97	116	135	154	173	192	211	230	249	268	287
30	16	36	57	77	97	117	138	158	178	198	219	239	259	279	300	320
35	31	52	73	95	116	137	159	180	201	223	244	265	287	308	329	351
40	45	68	90	112	134	157	179	201	223	245	268	290	312	334	357	379
45	60	83	106	129	152	175	198	221	244	267	290	313	336	359	382	405
50	74	97	121	145	168	192	216	239	263	287	311	334	358	382	405	429
55	87	111	135	160	184	208	233	257	281	306	330	354	379	403	427	452
60	99	124	149	174	199	224	249	274	299	324	349	374	398	423	448	473
65	111	136	162	188	213	239	264	290	315	341	366	392	417	443	468	494
70	122	148	174	200	226	253	279	305	331	357	383	409	436	462	488	514
75	132	159	185	212	239	266	293	319	346	373	400	427	453	480	507	534
80	141	168	196	223	251	278	306	333	361	388	415	443	470	498	525	553
85	149	177	205	234	262	290	318	346	374	402	431	459	487	515	543	571
90	156	185	214	243	272	301	330	358	387	416	445	474	503	532	561	590
95	162	192	222	251	281	311	340	370	400	429	459	489	518	548	578	607
100	167	198	228	259	289	320	350	381	411	441	472	502	533	563	594	624
110	176	209	241	273	306	338	370	403	435	467	500	532	564	597	629	661
120	184	217	251	285	318	352	386	420	453	487	521	554	588	622	656	689
130	190	225	260	295	330	365	400	435	470	505	540	575	610	645	680	715
140	196	232	268	304	340	376	413	449	485	521	557	593	630	666	702	738
150	201	238	275	313	350	387	424	462	499	536	573	611	648	685	723	760
160	205	243	281	320	358	396	435	473	511	550	588	626	665	703	742	780
170	208	247	286	326	365	405	444	483	523	562	601	641	680	720	759	798
180	210	251	291	331	372	412	452	493	533	574	614	654	695	735	775	0
190	212	254	295	336	378	419	460	502	543	585	626	667	709	750	791	0
200	214	257	299	341	384	426	468	511	553	595	638	680	722	765	0	0
220	219	263	307	351	396	440	484	528	572	616	661	705	749	793	0	0
240	224	270	316	362	408	454	500	546	592	638	684	730	776	0	0	0
260	229	277	325	372	420	468	516	563	611	659	707	754	0	0	0	0
280	235	284	334	383	433	482	532	581	631	680	730	779	0	0	0	0
300	241	292	343	394	445	497	548	599	650	701	752	0	0	0	0	0
CU.FT. SITE CLASS	7		6			5			4			3		2		1

SITE INDEX TABLES/PRODUCTIVITY CLASSES

APPENDIX - 10

Source: Curtis, Herman, and DeMars; "Height Growth and Site Index Curves for Douglas-fir in High Elevation Forests of Oregon-Washington Cascades."

XI. GLOSSARY

ACRE:	A PARCEL OF LAND CONTAINING 43,560 SQUARE FEET OF AREA. 0.4 HECTARE.
AGE, BREAST-HIGH:	THE NUMBER OF ANNUAL GROWTH RINGS BETWEEN THE BARK AND THE CENTER OF THE TREE, AS COUNTED AT BREAST HEIGHT.
AZIMUTH:	ANGLE OR DIRECTION FROM 1 TO 360 DEGREES. THE AZIMUTH PLUS 180 DEGREES IS THE BACK AZIMUTH.
BASAL AREA:	(A) OF A TREE, THE CROSS SECTIONAL AREA OF A TREE AT BREAST HEIGHT ON THE STEM. (B) OF A FOREST OR STAND, THE CROSS-SECTIONAL AREA AT BREAST HEIGHT OF ALL TREES WITHIN A UNIT OF AREA.
BASAL AREA FACTOR (BAF):	THE BASAL AREA PER UNIT OF AREA CORRESPONDING WITH A GIVEN CRITICAL ANGLE IN VARIABLE-RADIUS PLOT SAMPLING. THE BAF MULTIPLIED BY THE NUMBER OF TREES SAMPLED USING THE BAF EQUALS STAND BASAL AREA PER UNIT OF AREA.
BOLE:	TRUNK OR MAIN STEM OF A TREE.
BORDERLINE TREE:	A TREE THAT IS AT OR NEARLY AT THE LIMITING DISTANCE ASSOCIATED WITH A GIVEN BASAL AREA FACTOR. BORDERLINE TREES REQUIRED PRECISE CHECKING TO DETERMINE IF THEY ARE TO BE SAMPLED.
BREAST HEIGHT:	THE STANDARD HEIGHT--1.37 METERS ABOVE GROUND LEVEL--AT WHICH DIAMETER OF A STANDING TREE IS MEASURED. ON SLOPING GROUND, BREAST HEIGHT IS MEASURED ON THE UPHILL SIDE OF THE TREE.
CAMBIUM:	THE LAYER OF CELLS (IN A TREE) BETWEEN THE WOOD AND BARK.
CANKER:	LOCALIZED INJURY TO STEM, BRANCH OR ROOT; CAUSED BY DISEASE OR INSECTS.
CANOPY:	THE COVER OF BRANCHES AND FOLIAGE FORMED BY TREE CROWNS.
CENSUS WATER:	AREAS OF WATER MORE THAN 16 HECTARES (40 ACRES) OR WIDER THAN 200 METERS.
CHAIN:	ARCHIAC UNIT OF MEASURE FOR GROUND DISTANCES. A CHAIN EQUALS 66 FEET OR 20 METERS.

CONIFER: CONE-BEARING TREES, MOSTLY EVERGREENS, WITH NEEDLE OR SCALE-LIKE LEAVES BELONGING TO THE BOTANICAL GROUP GYMNOSPERMAE. ALSO REFERRED TO AS SOFTWOODS.

CONK: THE FRUITING BODY OF A WOOD-DESTROYING FUNGUS WHICH PROJECTS FROM THE TRUNK, ROOTS OR OTHER TREE PARTS.

CREW SUPERVISOR: NUMBER 1 BOSS PERSON.

CROOK: ABRUPT BEND OR CURVATURE IN A STEM; A DEFECT IN TIMBER AND PERSONS.

CROWN: THE PORTION OF A TREE CARRYING THE MAIN BRANCH SYSTEM AND FOLIAGE.

CROWN CLASS: THE SOCIAL POSITION OF A TREE RELATIVE TO ITS ABILITY TO RECEIVE DIRECT SUNLIGHT.

CROWN RATIO: THE PERCENT OF THE TOTAL HEIGHT OF THE TREE WHICH SUPPORTS LIVE CROWN.

CULL: (A) TREES OR LOGS OR PORTIONS OF LOGS THAT ARE OF MERCHANTABLE SIZE BUT ARE UNUSABLE FOR INDUSTRIAL WOOD PRODUCTS DUE TO DEFECTS (ROT OR FORM). (B) TO REJECT A LOG OR PORTION OF A LOG IN RESPECT TO GROSS VOLUME (C) THE DEDUCTION MADE FROM GROSS VOLUME OF A LOG TO ADJUST FOR DEFECT.

CULL OTHER: PERCENTAGE DEDUCTION OF VOLUME LOST DUE TO BROKEN OR MISSING PARTS, FORKS OR CROOKS.

CULL ROT: ASSESSMENT OF TREE ROT, AS VISUALLY INDICATED BY CONKS, ROTTEN SEAMS, ETC., CODED AS A CATEGORY OF PERCENTAGE OF VOLUME AFFECTED BY THE ROT.

DBH: DIAMETER BREAST HEIGHT: THE TREE DIAMETER MEASURED AT BREAST HEIGHT--1.37 METERS ABOVE GROUND LEVEL.

DEFOLIATOR: AN ORGANISM, USUALLY AN INSECT, WHICH FEEDS UPON, DAMAGES, OR STRIPS LEAVES AND NEEDLES FROM TREES.

EVEN-AGED STAND: A STAND IN WHICH INDIVIDUAL TREES ORIGINATED AT APPROXIMATELY THE SAME TIME. THE AGES OF TREES IN MATURE EVEN-AGED STANDS ARE SELDOM DIFFER BY MORE THAN 30 YEARS.

FIELD GRID LOCATION THE POINT CENTER ON WHICH THE GROUND LAND CLASS, OWNERSHIP AND PHOTOINTERPRETED VARIABLES (FOREST LAND STRATUM, DEVELOPMENT ZONE, STAGE OF DEVELOPMENT, STAND HEIGHT AND DENSITY) ARE BASED. THE FIELD GRID LOCATION IS THE PINPRICKED LOCATION OF THE OCC2 POINT 1 (CEDAR STAKED) ON REMEASURED

FIELD GRID LOCATION
CONT'D

PLOTS. ON PLOTS MISSING OR LOST SINCE OCC2, THE FIELD GRID LOCATION IS THE PINPRICKED LOCATION ON THE OCC2 PHOTOS. FOR PLOTS NEW TO THE INVENTORY AT OCC3, THE FIELD GRID LOCATION IS THE PINPRICKED LOCATION ON THE OCC3 PHOTOS.

FIXED-RADIUS PLOT: A CIRCULAR SAMPLED AREA WITH A SPECIFIED RADIUS. WITHIN THE SAMPLED AREA, ALL TREES OF A GIVEN SIZE, SHRUBS, OR OTHER ITEMS ARE TALLIED.

FORAGE: EDIBLE VEGETATION FOR WILDLIFE/LIVESTOCK.

FORB: A BROAD-LEAVED HERBACEOUS PLANT AS DISTINGUISHED FROM GRASSES, SHRUBS AND TREES.

GALL, LEAF: A TUMOR (ABNORMAL PROLIFERATION OF PLANT TISSUE) ON LEAVES CAUSED BY INSECTS OR DISEASE.

GLC: GROUND LAND CLASS. SEE PAGES 24 AND 26-31.

HARDWOODS: BROAD-LEAVED AND DECIDUOUS TREES AS OPPOSED TO HAVING NEEDLES. TREES BELONGING TO THE BOTANICAL GROUP ANGIOSPERMAE.

HEARTWOOD: THE INNER, NONLIVING CORE OF WOOD IN A TREE, GENERALLY DARKER THAN SAPWOOD.

HECTARE: A METRIC UNIT OF LAND MEASURE EQUAL TO 10,000 SQUARE METERS. 2.47 ACRES.

INCIPIENT: BEGINNING.

INGROWTH: TREES THAT HAVE GROWN PAST A MINIMUM SIZE THRESHOLD ON A FIXED-RADIUS PLOT SINCE PREVIOUS INVENTORY. IN EASTERN WASHINGTON, TREES NOT PRESENT AT OCC2 THAT ARE ALIVE AT OCCASION 3 AND GREATER THAN 2.5 CM DBH ON THE 2.1 METER FIXED-RADIUS PLOT.

LIMITING DISTANCE: THE SET OF DISTANCES FOR A SPECIFIED BASAL AREA FACTOR WHICH DETERMINES WHETHER A TREE IS IN OR OUT OF THE SAMPLE. THE DISTANCE IS THE PRODUCT OF THE TREE'S DBH MULTIPLIED BY THE PLOT RADIUS FACTOR. THE PLOT RADIUS FACTOR IN EASTERN WASHINGTON IS 0.165.

MAI: MEAN ANNUAL INCREMENT. MAI IS THE AVERAGE ANNUAL GROWTH OF A STAND AT A SPECIFIED AGE.

MYCELIUM: THE VEGETATIVE PART OF A FUNGUS; A MASS OF THREAD-LIKE FILAMENTS.

NONFOREST INCLUSION: AN AREA THAT IS NONFOREST, BUT LESS THAN 0.4 HECTARE IN SIZE. WHEN PART OR ALL OF A FIXED OR VARIABLE-RADIUS PLOT FALLS WITHIN A NONFOREST INCLUSION, THE INCLUSION IS SAMPLED LIKE THE SURROUNDING FOREST LAND.

NONSTOCKABLE: AREA OF FOREST LAND NOT CAPABLE OF SUPPORTING TREES DUE TO PRESENCE OF ROCKY CONDITIONS, STANDING WATER, UNIMPROVED ROADS, MASS SOIL SLUMPS, ETC.

OCCASION 1: THE INVENTORY OF 1967-68.

OCCASION 2: THE INVENTORY OF 1980.

OCCASION 3: THE CURRENT 1991 INVENTORY.

PC: PLOT CENTER. THE FIELD GRID LOCATION ON THE GROUND FOR EACH FIELD PLOT. ON REMEASUREMENT PLOTS, PLOT CENTER IS AT THE OCC2 CEDAR STAKE. ON MISSING OR LOST PLOTS, PLOT CENTER IS THE PINPRICKED LOCATION ON THE OCC2 PHOTOS. ON NEW PLOTS, PLOT CENTER IS THE PINPRICKED LOCATION ON THE OCC3 PHOTOS.

PI: PHOTO INTERPRETATION.

PIECE OF CAKE: PLOT THAT IS FLAT, NON-BRUSHY, NEAR A ROAD, WITH ENOUGH TREES FOR SHADE BUT NOT MORE THAN 2 PER POINT. WEATHER ON DAY THAT THE PLOT IS DONE IS SUNNY WITH HIGHS IN THE MID-60S. OWNER IS CONGENIAL AND HAS MAD DOGS ON SHORT CHAINS.

POLETIMBER: A TREE 12.5 TO 22.4 CM DBH.

RANGELAND: LAND ON WHICH THE NATURAL PLANT COVER IS COMPOSED PRINCIPALLY OF NATIVE GRASSES, FORBS, OR SHRUBS VALUABLE FOR FORAGE.

REAL BEAR: THE KIND OF PLOT YOU HOPE THE OTHER CREW GETS.

REGENERATION: THE RENEWAL OF A TREE CROP, WHETHER BY NATURAL OR ARTIFICIAL MEANS. A YOUNG, PRECOMMERCIAL-SIZED STAND.

RELEASE: FREEING A TREE FROM IMMEDIATE COMPETITION BY REMOVING OTHER TREES OR NONTREE COMPETITION

RESIDUAL: REMAINING.

ROT: DECAY. DECOMPOSITION OF WOOD BY FUNGI OR BACTERIA.

ROUNDWOOD: SECTIONS OF TREE STEMS, WITH OR WITHOUT BARK. INCLUDES LOGS, BOLTS, POSTS, PILINGS AND OTHER PRODUCTS STILL "IN THE ROUND".

RP: REFERENCE POINT. AN OBJECT (USUALLY A TREE) WHICH CAN BE LOCATED ON THE GROUND AND IDENTIFIED ON THE PHOTO. IT WILL BE TAGGED AND REFERENCED TO PLOT LOCATION FOR RELOCATION ON FUTURE INVENTORIES.

SAPLING: A TREE 2.5 TO 12.4 CM DBH.

SAPWOOD: THE OUTER LAYERS OF WOOD BETWEEN THE HEARTWOOD AND INNER BARK. GENERALLY LIGHTER IN COLOR THAN HEARTWOOD.

SEEDLING: A TREE LESS THAN 2.5 CM DBH THAT IS AT LEAST 15 CM DBH IN HEIGHT AND ESTABLISHED IN MINERAL SOIL. INCLUDES TREES WITH A HEIGHT LESS THAN 1.37 METERS.

SILVICULTURE: THE SCIENCE AND PRACTICE OF GROWING AND TENDING FOREST CROPS FOR SPECIFIED OBJECTIVES.

SITE: THE AGGREGATE OF ALL ENVIRONMENTAL CONDITIONS AGGECTING THE SURVIVAL AND GROWTH OF A PLANT COMMUNITY.

SITE CLASS: A CLASSIFICATION OF FOREST LAND IN TERMS OF PRODUCTIVITY POTENTIAL TO GROW CROPS OF INDUSTRIAL WOOD.

SITE INDEX: A MEASURE OF PRODUCTIVITY BASED UPON THE HEIGHT OFDOMINANT AND CODOMINANT TREES AT A GIVEN BASE AGE.

SNAG: A STANDING DEAD TREE. IN THE CURRENT INVENTORY A SNAG MUST BE AT LEAST 22.5 CM DBH AND AT LEAST 2 METERS TALL TO BE TALLIED.

SOFTWOODS: CONIFEROUS TREES, USUALLY EVERGREEN, HAVING NEEDLE OR SCALE-LIKE LEAVES.

STOCKING: A QUALITATIVE EXPRESSION THAT COMPARES THE NUMBER OF EXISTING TREES TO THE NUMBER DESIRED TO ACHEIVE OPTIMAL GROWTH AND VOLUME.

SUNSCALD: CAMBIUM DAMAGE TO THIN-BARKED STEM CAUSED BY OVEREXPOSURE TO SUN.

SWEEP: CURVE IN A STEM OR LOG WHICH DIFFERS FROM AN ABRUPT BEND. A TIMBER DEFECT.

TERMINAL LEADER: THE TOPMOST SHOOT OF A TREE. OR: A CREW SUPERVISOR WITH AN INCURABLE AND FATAL DISEASE.



TRACHEID:

PART OF WOOD STRUCTURE: A LONG, TUBELIKE CELL IN WOOD TISSUE.

TRACKABLE TREES:

SAMPLED TREES THAT ARE REFERENCED AND REMEASURED IN SUCCESSIVE INVENTORIES ON PERMANENT PLOTS.

VARIABLE-RADIUS PLOT:

A PLOT ON WHICH TREES ARE SELECTED FOR MEASUREMENT ACCORDING TO SIZE RATHER THAN BY THE FREQUENCY OF THEIR OCCURRENCE. THE LARGER THE DIAMETER OF A TREE THE FARTHER FROM PLOT CENTER IT CAN BE AND STILL BE SAMPLED. HENCE, THE CONCEPT OF VARIABLE-RADIUS PLOT.

WILT:

DROOPING OF FOLIAGE; OFTEN A DISEASE SYMPTOM. ALSO, A CONDITION AMONG FORESTRY PERSONNEL THAT IS ALL TOO COMMON AFTER AGE 40.

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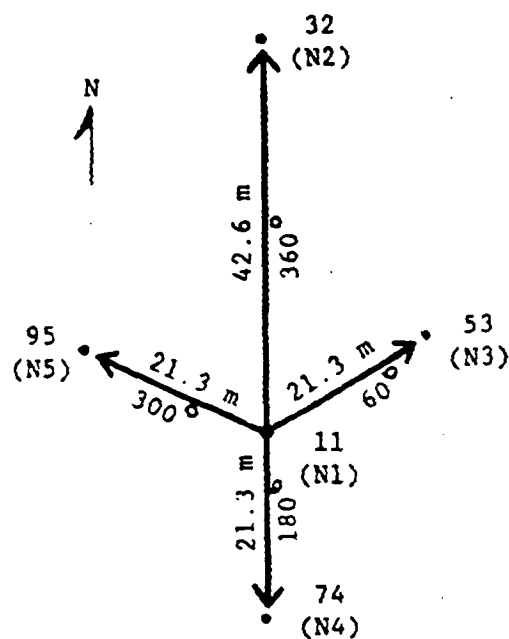
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OCC3 STANDARD LAYOUT

Point to point distances and azimuths on the standard layout of the 5-point plot.



(POINT NUMBERING
ADOPTED AT OCC3)

<u>Pt-to-pt</u>	<u>azimuth</u>	<u>distance</u>
11 to 32	360	42.6m
11 to 53	60	21.3m
11 to 74	180	21.3m
11 to 95	300	21.3m
32 to 11	180	42.6m
32 to 53	150	36.9m
32 to 95	210	36.9m
53 to 11	240	21.3m
53 to 32	330	36.9m
53 to 74	210	39.9m
74 to 11	180	21.3m
74 to 53	30	36.9m
74 to 95	330	36.9m
95 to 11	120	21.3m
95 to 32	30	36.9m
95 to 74	150	36.9m